CLINICAL STUDY OF PREPERITONEAL MESH REPAIR IN BILATERAL AND RECURRENT INGUINAL HERNIAS

A dissertation submitted to TAMILNADU DR.M.G.R MEDICAL UNIVERSITY,CHENNAI, TAMILNADU in partial fulfillment for the degree of M.S.GENERAL SURGERY

DEPARMENT OF GENERAL SURGERY

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CHENNAI

APRIL 2016

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I hereby declare that this dissertation titled "**A CLINICAL STUDY OF PREPERITONEAL MESH REPAIR IN BILATERAL AND RECURRENT INGUINAL HERNIAS**" is a bonafide and genuine research work carried out under the guidance of **DR.B.M.PABITHA DEVI MS**, Senior Assistant Professor, Department of General Surgery, and under the supervision of Chief Dr**. V. PANDY** MS, Professor, Department of General Surgery, Tirunelveli Medical College Tirunelveli, TAMILNADU

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ABSTRACT

BACKGROUND OF STUDY

Groin hernia is the one of most common performed surgery. There are many methods of hernia repair. Pre peritoneal mesh repair is one of innovative repair for bilateral and recurrent inguinal hernias.

OBJECTIVES

To study the effectiveness of Pre peritoneal mesh repair for bilateral and recurrent inguinal hernia with respect to wound healing duration, duration of hospital stay, post-operative complication and recurrence rate.

METHODS

All the materials for this study has been taken from 76 patients who got admitted to Tirunelveli Medical College hospital attached to Tamilnadu DR M G R Medical university, Chennai for the treatment of Groin hernia for one and half years.

All the patients included in the study underwent surgical management for Groin hernia. No patient in the study group underwent conservative management.

Patients underwent Preperitoneal mesh repair operative procedure for bilateral and recurrent inguinal hernias.

RESULTS

In our study bilateral and recurrent inguinal hernias were more common in age groups of 51 to 70 yrs.

1. 98.68% of our patients were males and 1.31% were females.
2. Bilateral inguinal hernias were common in the study than recurrent hernias.
3. All patients were operated in spinal anesthesia.
4. Time taken for patients to get back to normal activity was 2-3 days.
5. Post operative pain was mild in our study.

The post operative complication rate was minimal and during the brief follow up there were one recurrence.

CONCLUSION

Open preperitoneal mesh repair with suprapubic pfannensteil incision has found to have short duration of surgery, less peri operative complication and cost effectiveness to the patient. Still surgeons experience and orientation required in the repair.

KEY WORDS

Groin hernia; Preperitoneal mesh repair; cost effective; recurrence; return to normal activity.

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PROTOCOL TITLE: A CLINICAL STUDY OF PREPERITONEAL MESH REPAIR IN BILATERAL INGUINAL HERNIA PATIENTS AND RECURRENT INGUINAL HERNIA PATIENTS.

NAME OF PRINCIPAL INVESTIGATOR: Dr. S.NAMBIRAJAN, MBBS.,
DESIGNATION OF PRINCIPAL INVESTIGATOR: Post Graduate in MS General Surgery
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Dear Dr. S.Nambirajan, *The Tirunelveli Medical College Institutional Ethics Committee (TIREC) reviewed and discussed your application during the IEC meeting held on 08.10.2014.*

THE FOLLOWING DOCUMENTS WERE REVIEWED AND APPROVED

1.	TIREC Application Form	☑
2.	Study Protocol	☑
3.	Department Research Committee Approval	☑
4.	Patient Information Document and Consent Form in English and Vernacular Language	☐
5.	Investigator's Brochure	☑
6.	Proposed Methods for Patient Accrual Proposed	☑
7.	Curriculum Vitae of the Principal Investigator	☑
8.	Insurance /Compensation Policy	☐
9.	Investigator's Agreement with Sponsor	☐
10.	Investigator's Undertaking	☑
11.	DCGI/DGFT approval	☐
12.	Clinical Trial Agreement (CTA)	☐
13.	Memorandum of Understanding (MOU)/Material Transfer Agreement (MTA)	☐
14.	Clinical Trials Registry-India (CTRI) Registration	☐

THE PROTOCOL IS APPROVED IN ITS PRESENTED FORM ON THE FOLLOWING CONDITIONS

1. The approval is valid for a period of 2 year/s or duration of project whichever is later
2. The date of commencement of study should be informed
3. A written request should be submitted 3weeks before for renewal / extension of the validity
4. An annual status report should be submitted.
5. The TIREC will monitor the study
6. At the time of PI's retirement/leaving the institute, the study responsibility should be transferred to a person cleared by HOD
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Abnormal protrusion of part or whole of viscus through the wall that contains it.

"A protrusion of any viscus from its proper cavity is denominated a hernia. The parts are generally contained in a bag by a membrane with which the cavity is naturally invested"

-Sir Astley Cooper 1804

Inguinal hernias are among the most common problems encountered by the surgeon. Total 15% of surgical procedures are done are groin hernia repairs. Groin hernias account to nearly 75% of all abdominal wall hernias. Present hernia repair techniques involve anterior approach with mesh fixation like litchenstein repair, gilberts technique which was sutureless and mesh rutkow's hernioplasty with mesh plug, these techniques involve dissection of cord structures with attendant complications like nerve entrapment, testicular atrophy, orchitis and chronic groin pain.

Inguinal hernia surgery has continued to evolve from tissue repair to tension free mesh repair. Various tension free mesh repair

have been explained in both anterior and posterior preperitoneal approach. Though laparoscopic repair is popular in preperitoneal method, this method is still under debate because of long duration of surgery, need for general anesthesia, and associated complications[1]. Laparoscopic surgery requires well equipped instruments and cost effective to the patient is more.

Open preperitoneal mesh repair with suprapubic pfannensteil incision has found to have short duration of surgery, less peri operative complication and cost effectiveness to the patient[2.] Need of present study is to review the effectiveness and complication of Preperitoneal mesh repair in our institution.

AIMS AND OBJECTIVE OF THE STUDY

A. Age and sex distribution, occupation, duration of symptom, mode of presentation of bilateral and recurrent inguinal hernia in adults. To study the feasibility open preperitoneal mesh repair for bilateral and recurrent inguinal hernias

B. To study the peri operative complication of open preperitoneal mesh repair.

C. To study the post-operative complication with respect to pain, hematoma, wound infection and recurrence.

REVIEW OF LITERATURE

HISTORICAL ASPECTS OF INGUINAL HERNIA

In the entire history of surgery no subject has been as controversial as the repair of groin hernia.

--C.B.MCVay

PERIOD OF ASEPTIC SURGERY/THE LISTERIAN ERA(19th and 20th centuries) [8]

In 1867, Joseph Lister, Professor of orthopedic surgery at Glasgow infirmity presented his first paper on antiseptic surgery performed under carbolic acid spray

In 1869, McEwen recognized the important and the role of transversalis fascia in the repair of hernia. McEwen obliterated the inguinal canal with mattress sutures.

In 1871, Marcy, published the first article in United States on antiseptic herniorraphy, using carbolised catgut ligature. In 1877, Czerny introduced excising sac at superficial ring by pulling it, retracted and inverted at level of deep ring.

Kocher introduced transplantation of the sac anterolaterally with external oblique aponeurosis suturing.

Lucas-championniere introduced antisepsis to France. In 1885, he incised the aponeurosis of external oblique muscle, opening the inguinalcanal and imbricate the roof in the closure.

1880-90, has rightly been termed as "The Decade of Inguinal Hernia", for the significant contributions made towards hernia surgery by Lucas championniere, Marcy and Bassini.

The credit for modern herniology should be given to Marcy of United States. Marcy (1837-1924), was the first to indicate the importance of the high ligation of the hernial sac and closure of dilated inguinal ring as essential steps in the inguinal hernia repair.

Edoardo Bassini (1844-1924) of Pavia, Italy, revolutionized the treatment of inguinal hernia by the introduction of a technique designed to restore the conditions in the area of hernial orifice, which existed under normal circumstances.

He initiated the use of transversalis fascia, rectus sheath and interrupted silk sutures. He used to do bilateral hernia repairs and surgery for cryptorchidisim in the same sitting.

Bassini advocated inguinal canal reconstruction physiologically, recreating the deep and superficial openings with anterior and posterior walls. He sutured the conjoined transverses abdominis and internal oblique to the inguinal ligament with continuous silk sutures. His triple layer included transversalis fascia, which was divided from pubis to an inch beyond the internal ring. He emphasized closing the floor from below upwards to restore the valve-like mechanism.

William S Halsted (1852-1922) independently developed a similar procedure with few differences, which included the laying open of all three musculoaponeurotic layers, reforming the internal ring after strengthening the posterior wall and transplantation of the cord to a subcutaneous position and debulking the cord. This was called the Halsted I procedure, to distinguish it from the Halsted II procedure,

(also known as Ferguson-Andrew's procedure), where cord was kept along as per Ferguson and external aponeurosis imbricated as per Andrews. Bassini's procedure was adopted widely.

In 1940, McVay and Anson pointed out that, the rectus fascia, a portion of the tranversalis fascia that inserts into the lateral border of rectus muscle, was strong enough to prevent incisional herniation.

Darn Repairs [9]

To obtain tensionless or tension free posterior wall, natural tissue or biologic or synthetic materials were used to darn the posterior inguinal wall.

McArthur in 1901 used the pedicled strips of external oblique aponeurosis woven between the conjoint tendon and inguinal ligament.

Gallie and Lemesurier in 1921, published papers on using fascia lata strips as sutures woven into the muscles and the inguinal ligament and the tissues of the posterior wall of the inguinal canal--"Much as one would darn a sock".

Ogilvy in 1936, practiced floss silk lattice repairs with non absorbable material which was followed by Maingot. Pratt, in 1948, used steel wire followed by Koontz, who used tantalum gauze in 1950.

In 1948, Moloney introduced the forerunner of the modern nylon darn technique.

Patch Graft Repairs [10] .

Expended polytetrafluroethylene (ePTFE) has been adopted for both the external and pre-peritoneal approach, with good results. Recently, a bilayered patch device(Hernia system) for inguinal hernia has been introduced

Pre-Peritoneal Repairs [6]

Thomas Annandale of Edinburgh presented for the first time in 1876, the concept of the pre- peritoneal approach.

This approach was strongly recommended by 'Nyhus' in 1960.

The foremost proponent of today's pre-peritoneal approach is Stoppa (1968), who recommends it, especially for problematic cases in which repeated repairs of multiple recurrent hernias have been

carried out, and in which tissues have become scarred and weakened and the normal anatomy is destroyed.

Laparoscopic Inguinal Hernia Repair

Ger and his colleagues, in 1982, through laparoscope used Michel staple applied with a Kocher clamp to close peritoneal opening of the hernia sac.

EMBRYOLOGY[11, 12]

. The inguinal canal is formed by the processus vaginalis penetrating the embryological structures between the skin and peritoneum. This inturn leads to the descent of the testis, however the ovary is forbidden from descending.

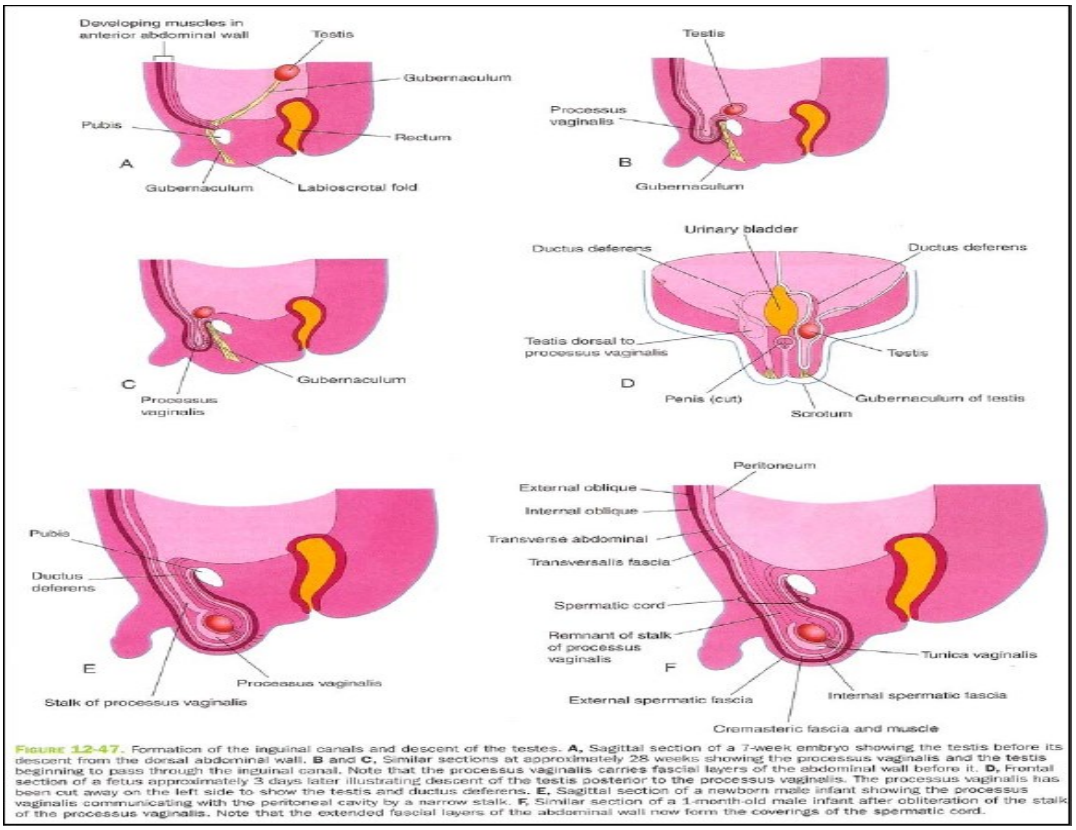


FIGURE 12-47. Formation of the inguinal canals and descent of the testes. **A,** Sagittal section of a 7-week embryo showing the testis before its descent from the dorsal abdominal wall. **B** and **C,** Similar sections at approximately 28 weeks showing the processus vaginalis and the testis beginning to pass through the inguinal canal. Note that the processus vaginalis carries fascial layers of the abdominal wall before it. **D,** Frontal section of a fetus approximately 3 days later illustrating descent of the testis posterior to the processus vaginalis. The processus vaginalis has been cut away on the left side to show the testis and ductus deferens. **E,** Sagittal section of a newborn male infant showing the processus vaginalis communicating with the peritoneal cavity by a narrow stalk. **F,** Similar section of a 1-month-old male infant after obliteration of the stalk of the processus vaginalis. Note that the extended fascial layers of the abdominal wall now form the coverings of the spermatic cord.

Fig 1: Embryology of testicular Descent

INGUINAL REGION

The testis originally lies on the posterior wall of the abdomen at the level of the upper lumbar vertebrae on the medial side of the mesonephrons attached by a peritoneal fold called mesorchism. The descent or migration of testis into its corresponding scrotal chamber is accomplished by following the lead of the fibro muscular band—gubernaculums testis. It arises mainly within a peritoneal fold called the plica inguinalis, which stretches from the inguinal region to the lower end of mesonephros. The gubernaculums attains greatest development about the sixth month and is attached above to the lower end of the testis and below, it pierces through the abdominal wall in its passage to the bottom of the scrotal pouch, thereby forming the inguinal canal.

Along with it a process of peritoneum, the processus vaginalis descends into the scrotum dragging with it thin fascial prolongations of the layers of the abdominal wall. Thus the processus vaginalis receives covering from the aponeurosis of the external oblique and internal oblique muscles and from fascia transversalis.

The blind extremity of the processus vaginalis gets invaginated for the reception of the descending testis. As the migration of the testis proceeds, the gubernaculums shortens and eventually atrophies, but some trace of gubernaculums persists at the bottom of the scrotum, below tunica vaginalis forms the scrotal ligament fixing the testis to the bottom of the scrotal pouch.

The cavity of the upper part of the processus vaginalis disappears near the end of the 8th month. In female, the gubernaculums extends from the lower poles of the ovaries to the labium majus through the inguinal canal. This part atrophies and is represented by the ligament of the ovary while the lower part which is developed within the plica inguinalis is represented by the round ligament of the uterus, extending from the side of uterus to the labium majus. A pouch of peritoneum is called the canal of nuck, accompanies the gubernaculums into the labium majus, similar to that of processus vaginalis.

ANATOMY [13, 14, 15]

The part of the anterior abdominal wall below the level of the anterior superior iliac spine forms the groin. The superior aperture

of the pelvis opens anteriorly as well as superiorly. The pubis and superior pubic (Cooper's) ligament are medial. The epigastric vessels and transversalis fascia condensation at the internal ring are lateral. The anterior femoral sheath, inguinal ligament and iliopubic tract form the inferior border and the transverses abdominis aponeurosis and its arch forms the superior border.

Skin

The deep ring is located approximately 2 cm above the skin crease between the thigh and the abdomen and midway between anterior superior iliac spine and pubic symphysis.. The skin of groin is innervated by the ilioinguinal, iliohypogastric and genital branch of genitofemoral nerves.

Subcutaneous Tissues of Groin

It divided into superficial fatty layer (Camper's fascia) and deeper membranous layer (Scarpa's fascia), which continues into perineum as the Colle’s fascia.

. It is accompanied by superficial epigastric artery, branches of superficial circumflex iliac vessels laterally and external pudendal inferior to pubic tubercle.

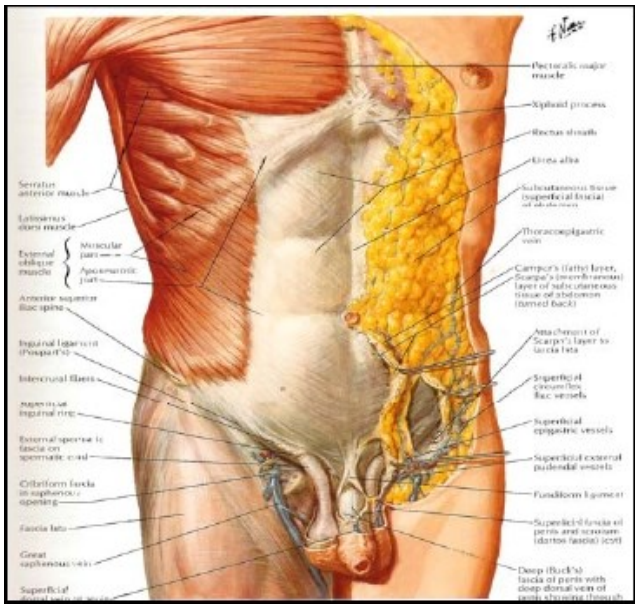


Fig 2: Anterior Abdominal Wall- Superior Dissection

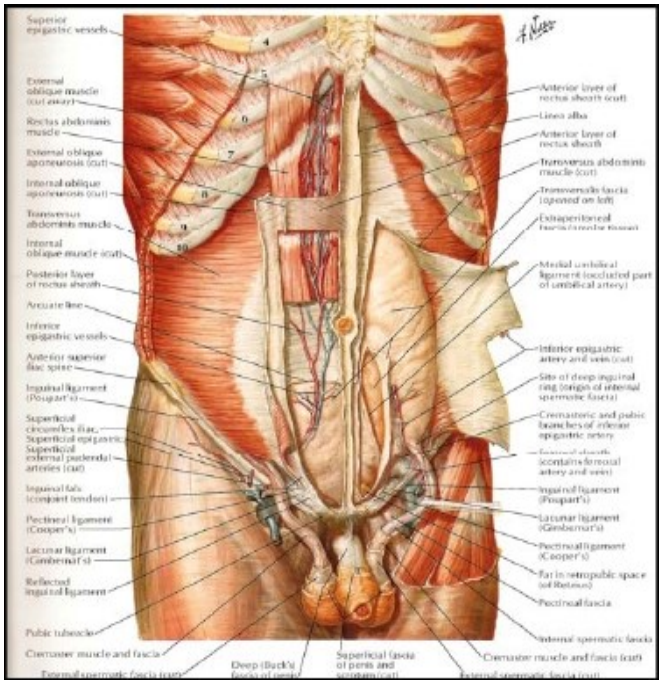


Fig 3: Anterior Abdominal Wall- Deep Dissection

Musculoaponeurotic structures

External Oblique Muscle and Aponeurosis.

It arises from the lower 8 ribs (5 to 12) and its fibers are directed downwards, forwards, andmedially. Above, the aponeurosis inter digitates with the serratus anterior muscle and continues as a sheet of fascia over both the muscles. The most posterior fibers run vertically downwards and insert into the anterior half of iliac crest. Between the last ribs and iliac crest, a free border forms the lateral boundary of lumbar triangle. From the anterior superior iliac spine to the Pubic spine, the aponeurosis forms a free border which is called inguinal ligament. The superficial inguinal ring is a triangular opening in the external oblique aponeurosis, 1 to 1.5 cm lateral to the pubic tubercle. The opening is formed by the splitting of external oblique.

Internal Oblique Muscle and Aponeurosis

The internal abdominal oblique muscle lies between the external oblique and the transverses abdominis muscle. It originates from the outer half of the inguinal ligament, from the intermediate

line on the iliac crests and from the posterior lamella of the lumbodorsal fascia through which it gains attachment to the lumbar spines. Fibers are directed upwards, forwards and medially. The anterior lamella accompanies the external oblique aponeurosis to form the anterior rectus sheath and the posterior lamella accompanies the aponeurosis of the transverses abdominis to form the posterior rectus sheath.

Transverses Abdominis Muscle and Aponeurosis

This is the most internal of the three flat muscles of the abdominal wall. The muscle arises from the iliopsoas fascia, from the inner lip of the anterior 2/3rd of the iliac crest, the lumbodorsal fascia between the iliac crest and 12th rib and from the inner surfaces of the cartilages of the lower 6 ribs where it inter digitates with the diaphragm. It passes medially in a transverse manner around the lateral aspect of the abdomen on to the anterior abdominal wall.

a. The continuous portion is the extension of the main muscle and aponeurosis, the lower border of which arches above and medial to cord structures and are called Transverses abdominis arch, which in 10% of cases due to its dense nature and

insertion into the pubic tubercle and the crest is called falx inguinalis. In 3% of cases the falx receives contribution from the internal oblique aponeurosis also thereby forming the conjoined tendon.

b. The discontinuous portion lies below the transverses arch, forms the posterior wall of the inguinal canal, medial to the internal ring. One fourth of these fibers show marked individual variations and most often is deficient, represented only by the transversalis fascia, thereby forming a critical weak spot in the posterior wall of the inguinal canal. The inferior most edge of this layer is formed by the "iliopubic tract" a collection of aponeurotic fibers. This tract arises laterally from the inner lip of the iliac crest, the anterior superior iliac spine and the iliopectineal arch. The fibers traverse medially separating away from the inguinal ligament and present beneath the deep inguinal ring. This ligament forms at least one border of a defect in an indirect, direct or femoral hernia and hence is suited for the repair of any these hernias.

Transversalis Fascia

This is a portion of the endoluminal fascia that encloses the abdominal cavity and peritoneum. The portion which invests the transverses muscle and aponeurosis is called Transversalis fascia. It is continuous with the lumbar, iliac, psoas, obturator and rectus fascia. At the deep inguinal ring there is a tubular projection of this fascia internal spermatic fascia that extends outwards in a blunt funnel like fashion to cover the ductus deferens and the spermatic vessels. However, the blunt funnel is not perfectly conical, but is skewed and the axis of the funnel is less oblique than the axis of the vessels through the deep inguinal ring. The redundant transversalis fascia in the medial side of the deep ring is called 'Transversalis fascia sling'.

Rectus Sheath

The posterior rectus sheath is lacking in any tendinous structure from the semicircular line to the pubis. Above this point, which is located midway between the umbilicus and the pubis, aponeurotic fibrous sheath from the transverses and internal oblique

muscles reinforce the posterior sheath. In the groin aponeurosis of all the three flat muscles contribute to the anterior sheath.

Peritoneum

In the groin as elsewhere, the peritoneum is a thin elastic membrane that serves only to provide a lubricating surface for its contained viscera. Because of the elastic character of the peritoneum it does not act in the prevention of hernia.

The Conjoint Tendon (Falx Inguinalis)

The transverse fibers of the transverses muscle proceed to their insertion in the rectus sheath and the linea alba, while the lower fibers course downward medially and caudally, sometimes to fuse with fibers of internal oblique as they insert into the anterior pubis and iliopectineal line. Only when the aponeurosis of the transverses and the internal oblique are fused some distance lateral to the rectus sheath, the term conjoined tendon is used.

The transverses muscle contributes 80% of the conjoint tendon. The conjoint tendon lies lateral to the rectus muscle and immediately deep to the superficial inguinal ring. It passes down to

its insertion deep to the inguinal and lacunar ligaments. The spermatic cord or round ligament of uterus lies anterior to it while passing through the superficial inguinal ring.

John E. Skandalakis et al (1993)14, state that

1. The conjoined tendon rarely exists.
2. The distinction between the ligament of Henle and conjoined tendon is one of anatomic nicety and of little practical significance, provided the distinction is recognized.
3. The term "conjoined area" may be applied correctly to the region which covers the ligament of Henle, the transverses abdominis aponeurosis, the inferomedial fibers of the internal oblique (musculature or aponeurosis), the reflected inguinal ligament and the lateral border of the rectus tendon and sheath.

Cooper's Ligament (Iliopectineal Ligament)

Cooper's ligament is remarkably constant in form and extent and represents the strongly reinforced periosteum of the superior ramus of the pubis. On the superior and internal aspect of superior pubic ramus, covering and immediately internal to the pectineal line,

the periosteum is supplemented by a considerable quantity of dense fibrous tissue so that it usually becomes 2 cm or even 3 cm thick. The fibers are adherent to and directed parallel to the superior ramus of the pubis. This fibrous reinforcement gradually fades away near midline on the internal surface of body of pubis. Laterally, it continues posteriorly along the brim of the true pelvis, becoming progressively thinner until it can no longer be distinguished from periosteum of ileum. Cooper's ligament is particularly important in the surgical correction of femoral hernias and large direct inguinal hernias, because it forms a solid anchor along the inferior or posterior aspect of these hernial defects, through which sutures in be placed with confidence that they will hold.

Inguinal Ligament (Ligament of Poupart)

It is the lower, thickened portion of external oblique aponeurosis extending from the anterior superior iliac spine to the pubic tubercle. This is also called Poupart’s ligament. Its edge is rolled inwards to form a gutter.

The lower edge of the inguinal ligament is loosely bound to the fascia lata by the Innominate fascia. This fascia also serves to bind together the collagenous fibers of aponeurosis and inguinal ligament.

Medially, the inguinal ligament gets inserted on the pubic tubercle and fans downward to the superior pubic ramus as the lacunar ligament. The medial attachment of the inguinal ligament is continuous with the insertion of the aponeurosis into the linea alba.

Ligament of Gimbernat

The Gimbernat's ligament is a triangular fascial extension of the inguinal ligament, before its insertion to the pubic tubercle.

Cremaster muscle

The cremaster consists of a number of loosely arranged muscle fasciculi lying along the spermatic cord

Inguinal Canal

It begins at the site of emergence of the spermatic cord through the transverses aponeurosis (internal ring) and ends at the pubic tubercle. It is oblique and 3.75 cm long, slanting downwards and medially, parallel with and a little above the inguinal ligament. It

extends from the deep to the superficial inguinal ring. The boundaries are: **Anteriorly**: the muscular fibers of the internal oblique in 1/3rd lateral boundary, external oblique aponeurosis in medial 2/3rd, superficial fascia ,skin.

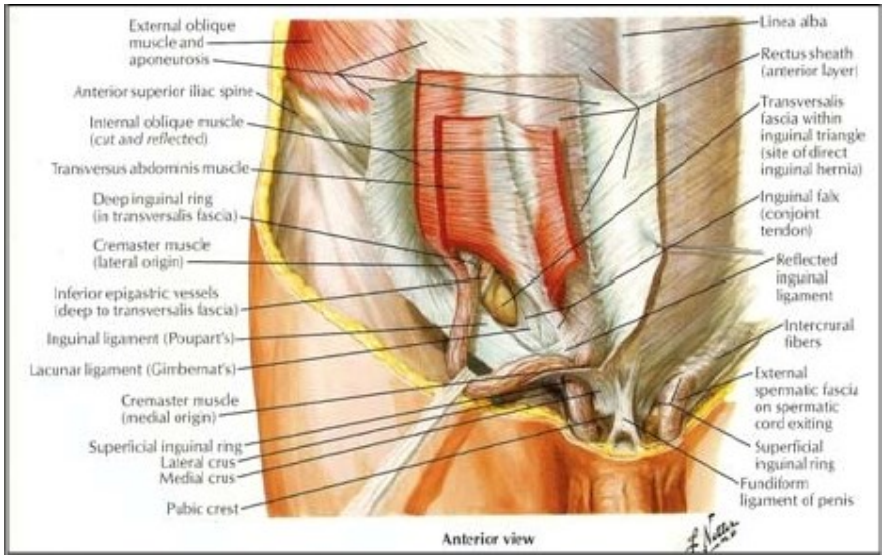


Fig :4. Inguinal Canal- Anterior view

Posteriorly: The transversalis fascia, reinforced medially by the falx inguinalis (when present).

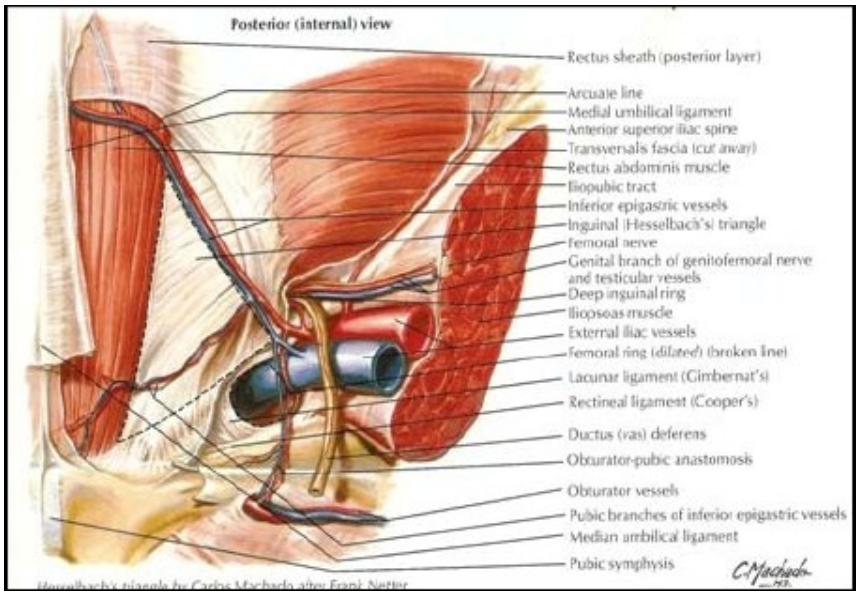


Fig 5 : Inguinal Canal- Posterior view

Superiorly: The arched fibers of internal oblique and transverses aponeurosis.

Inferiorly: The inguinal ligaments and it continuation, lacunar ligament.

Hasselbach's Triangle

It is bounded medially by the lateral border of the rectus sheath, laterally by the inferior epigastric vessels and below by the inguinal ligament.

These boundaries have to be redefined to include only those structures that are in contact with the posterior inguinal wall in the same plane. Redefined boundaries are: Rectus sheath with or without falx inguinalis, inferior epigastric vessels and iliopubic tract and Cooper's ligament.

Structures passing through the inguinal canal

Spermatic cord: Originates at the deep ring and consists of

a. Arteries: Testicular, cremasteric and artery to vas.

b. Veins: Corresponding veins, mainly testicular (pampiniform plexus).

c. Nerves: Genital branch of genitofemoral nerve, cremasteric nerve, and Sympathetic plexus derived from Para aortic and pelvic plexus.

d. Lymphatics of the testes.

e. Vas deferens and areolar connective tissue.

Coverings of the spermatic cord from within are processus vaginalis, Internal spermatic fascia (Transversalis fascia),

cremasteric fascia (Internal oblique muscle and fascia) and external spermatic fascia (External oblique muscle and fascia).

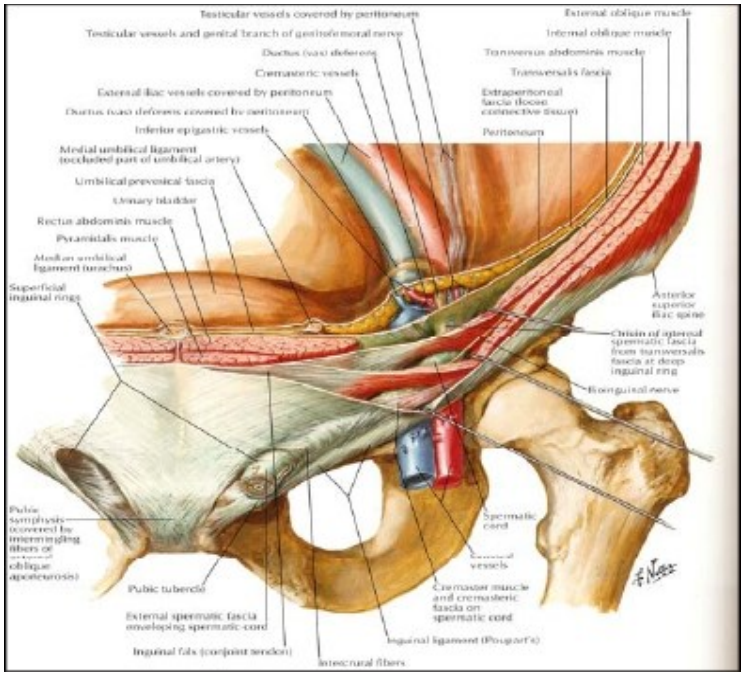


Fig 6: Inguinal Canal and Spermatic Cord

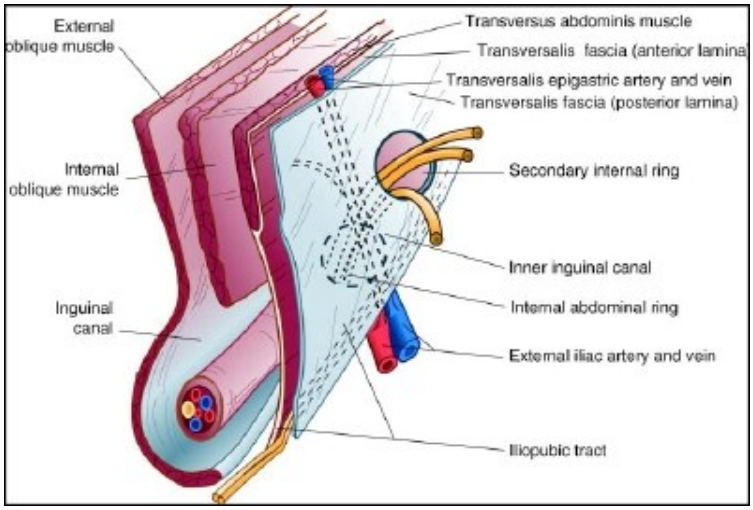


Fig 7: Cross section of inguinal canal

Blood Vessels

The external iliac artery gives off two major branches, before crossing beneath Poupart's ligament, where it becomes the femoral artery. These tributaries, the (deep) circumflex iliac and the (inferior) epigastric vessels, are not vital. The latter, serves as the medial border of the deep ring, or the lateral border of the direct triangle. Its course can be followed topographically by an imaginary line connecting a point midway between the umbilicus and the pubis. The inferior epigastric artery gives off two branches, the external spermatic cremasteric and the pubic branch. The main inferior epigastric artery runs vertically upwards in the preperitoneal space to enter and ramify with the rectus abdominis muscle forming collateral connections.

The cremasteric vessel exits along the medial aspect of the deep inguinal ring

Nerves

The muscles of the abdominal wall are innervated by the lower six thoracic and first lumbar nerves. The essential nerves of

the groin are the ilioinguinal, the iliohypogastric and the genitofemoral

Pre peritoneal space:

Pre peritoneal space (extra peritoneal) is easily cleavable space situated between peritoneum internally and transversalis fascia externally.

Significant parts of preperitoneal space includes myopectineal orifice of Fruchaud, the prevesical space of Retzius, the space of Bogros and the retroperitoneal peri urinary space.

Myopectineal orifice of Fruchaud :

The myopectineal orifice is beneath the arching lower boarder of transeversus abdominis and internal oblique muscle is bounded laterally by iliopsoas muscle and medially by lateral edge of rectus abdominis muscle and inferiorly by pubic pectin. Myopectineal orifice represents the potentially weak area in abdominal wall that permits the inguinal and femoral hernias.

Space of Retzius :

The space of Retzius extends from muscular floor of the pelvis to the level of the umbilicus. Anteriorly the bodies of the pelvic bones, medial portions of pubic rami and posterior lamina of rectus sheath bound it to the level of arcuate lines of Douglas.

In this pelvis the prevesical fascia and lateral pillars of bladder and the covering of pelvic peritoneum bound the space posteriorly. More superiorly vesicoumbilical fascia and the peritoneum provide a posterior wall of the space. Space of Retzius is closed laterally along the line of fusion provided by inferior epigastric vessels and the tissue that encloses them.

Space of Bogros:

This space extends upwards in to retroperitoneal area and some workers state that it continues medially with space of Retzius but is separated by line of fusion along the inferior epigastric vessels. Though there are no major structures pass through this space but the wall contain important nerves and vessels which have to be protected during dissection.

CONTENTS OF PREPERITONEAL SPACE OF INGUINOFEMORAL REGION

1. **VASCULAR**

ARTERIES	VEINS
External iliac and its branches	External iliac vein
Deep circumflex iliac artery	Deep circumflex iliac vein
Inferior epigastric artery	Inferior epigastric vein
	Bendavid vein

2. **NERVES**

Ilio inguinal nerve	Femoral nerve
Iliohypogastric nerve	Lateral cutaneous nerve of thigh
Genito femoral nerve	L1, L2, L3 ventral rami

Spermatic plexus(sympathetic and sensory)

AETIOLOGY AND PATHOPHYSIOLOGY OF INGUINAL HERNIA

The aetiology of an inguinal hernia is mainly multifactorial.

Evolution[16]

Groin hernias all share the common feature of emerging through the myopectineal orifice of Fruchaud, The absence of posterior rectus sheath below the arcuate line and only a rather substantial transversalis fascia unsupported by muscles or aponeurosis, resisting the intra abdominal pressure.

CONGENITAL FACTORS

a. **Patent processus vaginalis:**. The entire processus vaginalis may remain patent or only part of it, giving rise to indirect hernia, scrotal hydrocele, and encysted hydrocele of cord or hydrocele of canal of Nuck in female. The presence of patent processus vaginalis does not necessarily indicate that hernia is present or does it mean that one will necessarily develop in future.

b. **Females** are particularly free of direct inguinal hernia. The narrowness of the interval between the transverses arch and the inguinal ligament is an important factor protecting women against direct hernia. On the other hand, musculoaponeurotic attachments in women are such that they frequently develop femoral hernia.

c. **ANATOMICAL FACTORS**

Shutter mechanism:

The accepted explanation for this is the physiologic "Shutter mechanism" which is activated when the abdominal muscles contract to increase intra abdominal pressure. As the internal oblique and transversus abdominis muscles contract, their lower fibers forming "the conjoined tendon" also sharply contracts and as the fibers shorten, the arch straightens out and descends to come to lie close to or on the inguinal ligaments and so covers and protects the fascia transversalis.

Raised intra abdominal pressure

The balance between the resistance of the abdominal wall and the intra abdominal pressure may upset even in a fit young man who is suddenly called upon to lift an extremely heavy weight.

Integrity of the fascia transversalis

These factors include connective tissue disorders like Marfan's, Ehler'Danlos and Hurler - Hunter syndromes and mesenchymal metabolic defects causing a deficiency of collagen and structural abnormalities of the collagen fibers, predisposing to groin hernia.

Cigarette smoking

It is found that the substances in cigarette smoke inactivate antiproteases in lung tissues and so upset the protease/anti-protease system which is responsible for destruction of elastin and collagen of the rectus sheath and fascia transversalis and predispose to herniation in smokers .

Physical exertion

The etiology of groin herniation has been strongly related to manual work strains of lifting and strong muscular or athletic exertion.

General contributing factors

Others like weakening of muscle and fascia by advancing age, lack of physical exercise, obesity and multiple pregnancies. Pulmonary disease like COPD and emphysema, prostatisim, chronic constipation, diverticular disease, genito-urinary causes like cystitis, cystocele, and urethrocele contribute to formation of groin hernia.

RECURRENT GROIN HERNIA

The recurrence rate after initial repair of a groin hernia varies from 1% to 30%.

Early recurrence (within 2-3 years of repair)

The early group of recurrence is mainly caused by failure on the part of surgeon and by infection. Some of the causes are as follows:

1. **Experience of the surgeon:**
2. **Tension on the repair**
3. **Infection**
4. **Suture material:**
5. **Suturing techniques**.
6. **Other factors anatomical indicators in recurrence**

    - Unrecognized hernias
    - dissection/ sac ligation is incomplete.
    - deep ring is closed inadequately
    - Inadequate reconstruction of the internal ring

General factors:

General Conditions:

Malnutrition, jaundice, prolonged infection chronic debilitating diseases, malignant diseases and long-term steroid therapy influence on the success of groin hernia repair by influencing wound healing and collagen production.

Age:

The recurrence rate is lower following repair of primary of recurrent inguinal hernia in older age groups than in younger patients.

Smoking:

Ascites:

Metabolic defects:

Local factors:

Repeated repairs:

Defects grow larger with each attempt at repair and tissue become progressively stiff and unyielding.

Femoral hernia:

Failure of post wall following Lothissen approach for femoral hernia result in recurrence.

Size of hernia:

Large hernias recur more often than smaller ones.

Emergency repair:

Because of wide deep ring and friable tissue with common postoperative infection recurrence rates are high.

Type of repair:

The answer is the method that the surgeon knows well and does best.

Incision:

Poor exposure leads to inadequate repair and recurrence.

Missed hernias:

Posterior wall buttress:

Failure to construct this reinforcement of the posterior wall of the inguinal canal.

Medial recurrence:

Occurs if medial anchoring has not been sufficient.

Late recurrence

COMPONENTS OF INGUINAL HERNIA [18, 19]

The Sac: Different parts of the Hernial Sac

A. Mouth: This is path between the sac interior and the abdominal cavity **B. Neck:** This is narrowest section between the mouth and the body of sac.

C. Body: It lies between the neck and the Fundus.

D. Fundus: This is the blind end or the distal most part of the sac.

E. Contents of Hernia: These can be almost any abdominal viscous, except the liver.

Coverings:

Coverings of an indirect inguinal hernia are (from inside out) as follows:

- Extra peritoneal fatty tissue
- Internal spermatic fascia
- Cremasteric fascia
- External spermatic fascia
- Two layers of superficial fascia and
- Skin

In case of a direct hernia the coverings are as follows:

- Extra peritoneal fatty tissue
- Fascia transversalis
- Conjoint tendon
- External oblique aponeurosis
- 2 layers of superficial fascia and
- skin

CLASSIFICATION OF INGUINAL HERNIAS [17-19, 21-24]

Anatomical classification [18, 19]

Classification according to descent of the sac

- **Bubonocele:** The persistent patent process's vaginalis is obliterated at external ring and hernia is constrained till it.
- **Funicular:** The persistent patent process's vaginalis is obliterated above the epididymis. When the sac is occupied the contents of the sac can be separately felt from testis.
- **Complete:** The persistent patent process's vaginalis is upto the testis and hernia encircles the testis.

Classification depending on the contents of hernia

Omentocele	Omentum
Richter's hernia	Circumferential portion of intestinal wall
Littre's hernia	Meckel's diverticulum
Enterocele	Intestine
Cystocele	Urinary bladder

- **Other varieties**

Sliding/hernia en-glissade	Caecum,urinary bladder
Maydl's hernia	W – shaped loop of intestine
Amyand s hernia	Appendix
Saddle/pantaloon hernia	Hernia on either side of epi gastric vessels

CLINICAL CLASSIFICATION [19]

This is based on the clinical presentation of hernia.

Reducible hernia	**Contents are reducible**
Irreducible hernia	**Adhesions within the contents,contents to sac,constricted neck**
Obstructed hernia	**Irreducibility+obstruction**
Strangulated hernia	**Irreducibility+obstruction+gangrenous ischemia**
Inflammed hernia	**Inflamed appendix/salphinx/meckel's diverticulum**

Table 1: Modified Gilberts' Classification by Rutkow and Robbins (34)

Type 1	Indirect inguinal hernia, tight internal ring through which passes a peritoneal sac of any size
Type 2	Indirect inguinal hernia, moderately enlarged internal ring that measures no more than 4 cm
Type 3	Indirect inguinal hernia, patulous internal ring of more than 4 cm
Type 4	Direct inguinal hernia, essentially the entire floor of the inguinal canal is defective
Type 5	Direct inguinal hernia, diverticular defect of no more than 1 cm or 2 cm in diameter
Type 6	Both indirect and direct inguinal hernia (Pantaloon hernias)
Type 7	Femoral hernia

Fig 8: Modified Gilberts classification

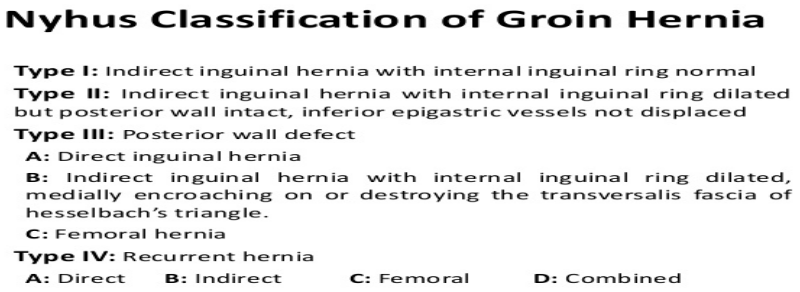


Fig 9: Nyhus classification

EUROPEAN HERNIA SOCIETY CLASSSIFICATION:

Primary or Recurrent(P or R)
Lateral, Medial or Femoral(L,M or F)
Defect size in finger breaths(assumed to be 1.5cms)

A primary indirect, inguinal hernia with 3cm defect size would be PL2.

CLINICAL FEATURES [25, 26]

"Clinical diagnosis is an art and mastery of an art has no end you can always be a better diagnostician".

- L.Clendening(1884-1943)

Symptoms

Lump or swelling in the groin, though some patients may describe a sudden pain and bulge that occurred while lifting or straining. Some patients complain of a dragging sensation and particularly with indirect inguinal hernia, radiation of pain into the scrotum

Systemic Symptom.

The four cardinal symptoms of intestinal obstruction, colicky abdominal pain, vomiting, abdominal distension and absolute constipation. In late cases of strangulation where gangrene has set in, patient can present with features of peritonitis more so if perforation of bowel has occurred.

Signs

On inspection in standing position a bulge or swelling will be seen in groin. This might disappear in lying down position if the hernia is reducible spontaneously in direct hernia. Impulse on coughing is present in reducible hernia. Loss of rugosities of scrotal skin in large inguino-scrotal hernias is seen. Visible peristalsis is seen in Enterocele. Malgaigne's bulges are seen in lax abdominal wall.

An indirect hernia is sausage or pear shaped and lies parallel to the inguinal ligament. After reduction it reappears more laterally and runs down above the inguinal ligament towards the scrotum. A direct hernia is more rounded, more medial, bulges forward and tends not to

go down to scrotum. After reduction it reappears in a forward direction.

On palpation

Reducing the hernia by manipulation is called “taxis” and it is performed in lying down position of the patient. As the hernia is reduced following features are noted:

a. Gurgling sound felt in Enterocele.

b. In Enterocele first part take longer to reduce and in Omentocele later part takes longer.

c. Impulse on coughing is felt.

Internal ring occlusion test: Internal ring is occluded and patient is asked to cough. If a bulge is seen medial to the occluding finger , it is direct hernia, if not indirect.

Finger invagination Test: After reduction of the hernia, this test may be performed to palpate the hernial orifice. The skin is invaginated from the bottom of the scrotum by little finger, which is pushed up to palpate the pubic tubercle. The finger is then rotated and pushed further up into the superficial inguinal ring. Normal ring is a

triangular slit, which admits only the tip of a finger. The patient is asked to cough.

Normally by pinchcock action, the finger will be squeezed by approximation of two pillars. A palpable impulse will confirm the diagnosis of hernia. When the finger enters the ring, it goes directly backwards in direct hernia and it goes upwards, backwards and outwards in indirect hernia. The finger is again rotated so that the pulp of the finger looks backwards. The patient is again asked to cough. If the impulse is felt on finger's pulp, it is direct hernia, if on the finger's tip, then it's indirect.

Three Finger Test or Zieman's Technique: This test can be done only when there is no obvious swelling or after the hernia has been completely reduced. In this test the finger is placed at the site of internal ring, another at the external ring and one on saphenous opening. The patient is asked to cough, when impulse is felt at the ring, then it is indirect hernia. If impulse is felt at external ring it is direct hernia and if impulse is felt at saphenous opening it is femoral hernia. Percussion note over the swelling: Tympanic over Enterocele and impaired or dull in Omentocele.

Auscultation: Bowel sounds will be heard in Enterocele.

Examine the scrotum for thickened spermatic cord, testis whether absent or atrophic or have a hydrocele. An incarcerated hernia is soft and non-tender, but irreducible. A strangulated hernia is tense, swollen, tender and irreducible and becomes red, edematous an inflamed.

Examine for stricture urethra and prepuce for phimosis and external urethral meatus for pinhole meatus. Per rectal examination is done for benign enlargement of prostate or any growth.

Abdominal Examination: For any abdominal lump, ascites, and divarication of recti.

Respiratory system: To rule out COPD and Koch's.

DIAGNOSIS [17]

Physical examination

Physical examination is the best way to determine the presence or absence of an inguinal hernia. The diagnosis may be obvious by simple inspection when a visible bulge is present. The differential diagnosis must be considered in questionable cases. Non-visible

hernias require digital examination of the inguinal canal. This is best done in both the lying and standing position.

PREOPERATIVE INVESTIGATIONS

Careful history taking and thorough physical examination and investigations are of paramount importance for the assessment of patients for surgery.

1. Laboratory investigations

- Complete blood examination for Hb%, BT, CT and blood sugar, urea and serum

  creatinine.

- Urine analysis for Albumin, Sugar and microscopic study.

2. X-ray Chest to rule out TB, COPD, emphysema, malignancy of lungs.

3. Electrocardiogram and Echocardiogram to rule out atherosclerotic and ischemic heart disease in patients at risk are of high value.

4. USG abdomen to rule out any prostatomegaly, tumors of colon, kidney, liver, ascites and size of prostate and post voidal residual urine.

5. Roentengen studies in Hernia.

- Plain X-ray abdomen in intestinal obstruction, incarcerated hernia and Ritcher's hernia.
- Barium Enema in sliding hernia.
- Herniography-Positive contrast peritoneography used for the diagnosis of hernias in the inguinofemoral region and the pelvis is called herniography.

SURGICAL MANAGEMENT OF INGUINAL HERNIA[9, 11, 17, 27-34]

Non-operative treatment [42]

The term "watchful waiting" is used to describe this non-operative treatment recommendation. It is only applicable in asymptomatic, minimally symptomatic hernias.

A truss is a mechanical appliance consisting of a belt with a pad that is applied to the groin after spontaneous or manual reduction of hernia. The purpose is to maintain reduction and to prevent enlargement. Symptomatic relief is achieved.

Truss is associated with complication. Atrophy of the spermatic cord occurs in some cases and an eventual repair is made more difficult by the constant mechanical pressure in the groin area that renders the tissue more difficult to dissect due to atrophy and fibrosis.

Operative Treatment of inguinal hernia [27-29, 43, 44]

Operative treatment –

(a) Herniotomy

(b) Herniorrhaphy

(c) Hernioplasty

a) **Herniotomy** [27-29] **–** transfixation of sac's neck and ligation, and then excision.

INDICATIONS

(a) In infants and children with preformed sac

(b) In young adults (very good inguinal musculature)

b) **Herniorrhaphy –** Here there is additional repair of the posterior wall of inguinal canal by opposing conjoint tendon to inguinal ligament. The suture materials which are used for such

repair are usually non absorbable material example- prolene or silk.

Indications :

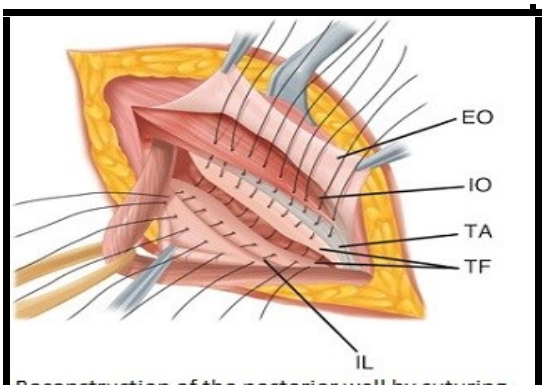
1) In indirect hernia(exception children < 18 years)

2) In patients with quite good musculature.

Types

(1) **Modified Bassini' s repair** [35]

Strengthening of the posterior wall of the inguinal canal by interrupted stitch of the lower margin of the conjoint tendon to the inner margin of the inguinal ligament behind the cord. And the most medial suture should be passed through periosteum of pubic tubercle.

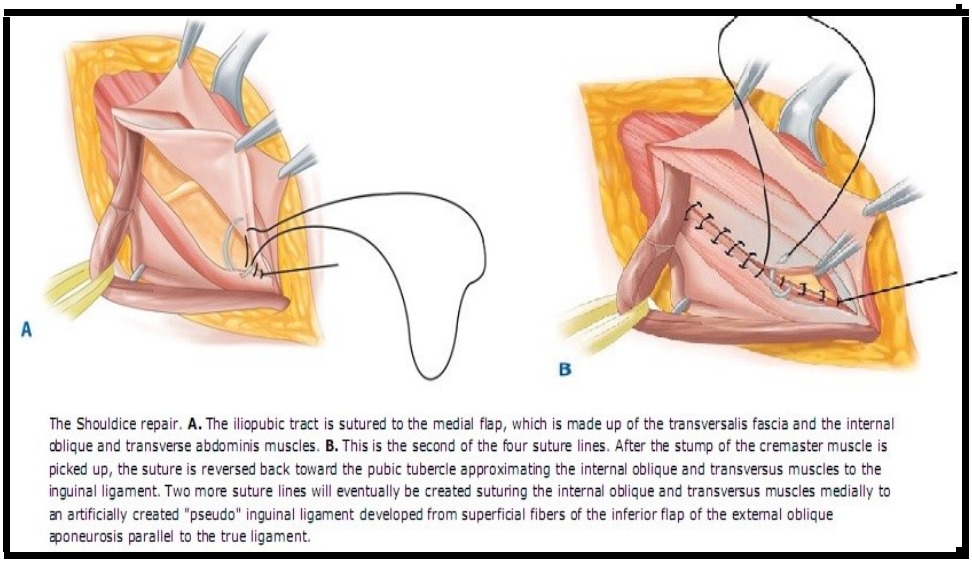


Reconstruction of the posterior wall by suturing Transversalis fascia(TF), Transversus abdominis muscle(TA) and Internal oblique(IO)

FIGURE 10: MODIFIED BASSINI' S REPAIR

(2) **The Shouldice repair** [43, 44]

The Shouldice technique is pure tissue hernia repair.hernial sac is ligted at the internal inguinal ring. The transversali's fascia is incised from the deep inguinal ring to pubic tubercle. The inferior epigastri'c vessels are preserved. The inferior flap of the transversalis fascia, is sutured continuously to the posterior aspect of the superior flap of the transversalis fascia until the internal ring is encountered. At the internal ring, the second layer is the re-approximation of the superior edge of the transversalis fascia to the inferior fascial margin and the shelving edge of the inguinal ligament.A third suture is started at the tightened inguinal ring, joining the internal oblique and transversus abdominis aponeurosis to external oblique aponeurotic fibers just superficial to the inguinal ligament. This layer is continued to the pubic tubercle where it reverses upon itself to create a fourth suture line.



The Shouldice repair. **A.** The iliopubic tract is sutured to the medial flap, which is made up of the transversalis fascia and the internal oblique and transverse abdominis muscles. **B.** This is the second of the four suture lines. After the stump of the cremaster muscle is picked up, the suture is reversed back toward the pubic tubercle approximating the internal oblique and transversus muscles to the inguinal ligament. Two more suture lines will eventually be created suturing the internal oblique and transversus muscles medially to an artificially created "pseudo" inguinal ligament developed from superficial fibers of the inferior flap of the external oblique aponeurosis parallel to the true ligament.

FIGURE 11: SHOULDICE REPAIR

(3) **The Marcy's repair**

(4) **Halsted operation with subcutaneous transplantation of cord (Halsted I)**

(5) **The Ferguson operation**

(6) **The Andrews operation**

(7) **Halsted II (Ferguson – Andrews operation)**

(8) **Nylon darn inguinal hernia repair**

HERNIOPLASTY [31]

In 1984 Lichtenstein introduced tension free hernioplasty. It is herniotomy and post wall reinforcement by either autogenous material or heterogeneous material.

Indications of hernioplasty-

(1) indirect hernia – with poor tone of muscles

(2) direct hernias

(3) recurrent hernias

(4) Patient who do strenuous jobs or suffering from chronic cough etc.

(1) LICHTENSTEIN TENSION – FREE HERNIOPLASTY:

A 5cm skin incision which starts from the pubic tubercle and extends laterally within Langer's line is made 2cm above and parallel to the medial half of inguinal ligament is made. External oblique aponeurosis is opened. The cord with its cremasteric covering is separated from the floor of inguinal canal and pubic bone. In case of direct hernias, the large sacs are inverted with absorbable suture. A thorough exploration of groin is necessary to rule out co- existing femoral hernia.

A sheet of 6 x 11 cm of mesh is used for reinforcement of posterior wall. The medial end of the mesh is cut to the shape of

the medial corner of inguinal canal. The rounded corner is sutured with non absorbable monofilament suture material to the anterior rectus sheath above the public bone and overlapping the rectus sheath by 1 to 1.5 cm. This is a crucial step in the repair, because failure to cover this bone with the mesh can result in recurrence. external oblique aponeurosis is then closed.

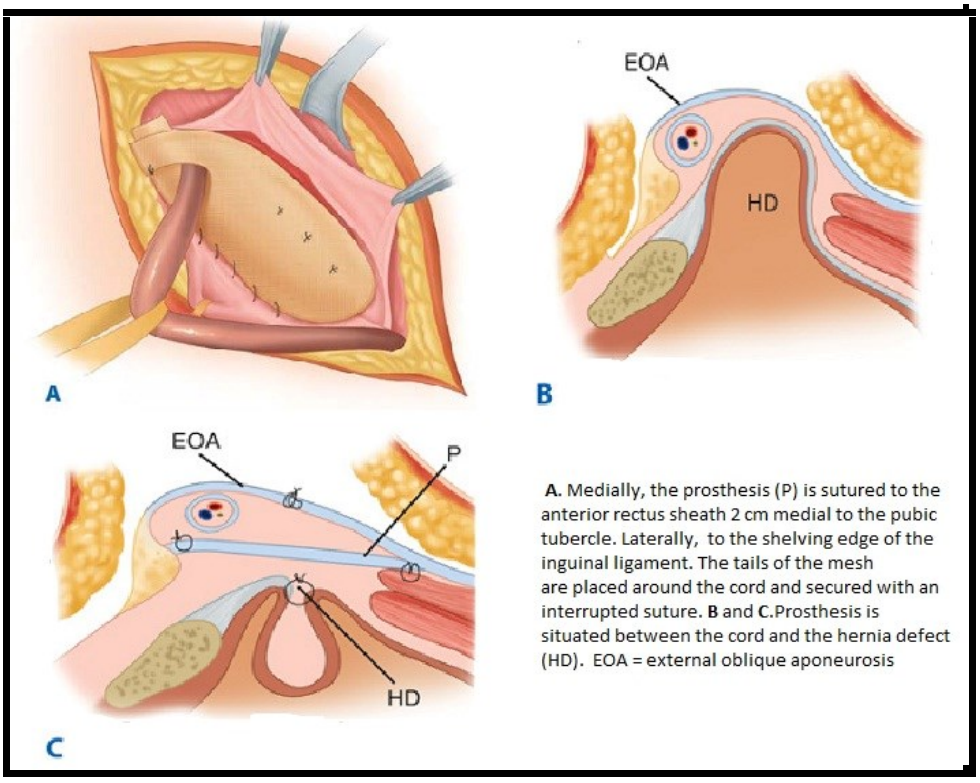


FIGURE 12: LICHTENSTEIN TENSION – FREE HERNIOPLASTY

2) Plug Repair of Inguinal Hernia [47]

Indication – Recurrent inguinal hernias and femoral hernias

The external aponeurosis is exposed only in the region of the location where hernia can be seen. Spermatic cord is dissected only upto hernial sac and is is pushed back into the preperitoneal tissue. The plug is then prepared by coiling one or two polypropylene strips with a dimension of 20x 2cm. It must fit snugly into the hernial orifice. The cylinder is fixed in hernial annulus by 6 prolene sutures placed above cylinder, the external aponeurosis, wound closed in layers.

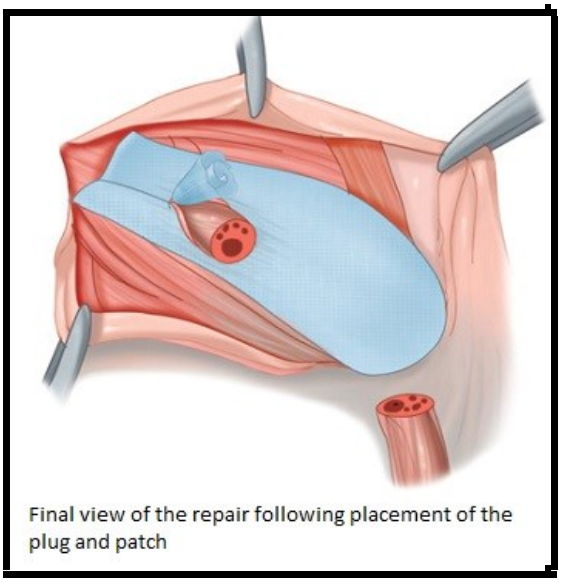


FIGURE 13: PLUG REPAIR OF INGUINAL HERNIA

4) Preperitoneal hernia repair [36]

It is the hernial repair done anteriorly.

Advantages-

1) It provides visualization of all areas of inguinal herniation as well as the confounding structures including the element of sliding hernias are possible.

2) It minimizes bowel and bladder injury.

Laparoscopic Inguinal Hernia Repair [8, 36] Two techniques are used.

1. TAPP – Transabdominal preperitoneal repair

2. TEP– Totally extraperitoneal approach.

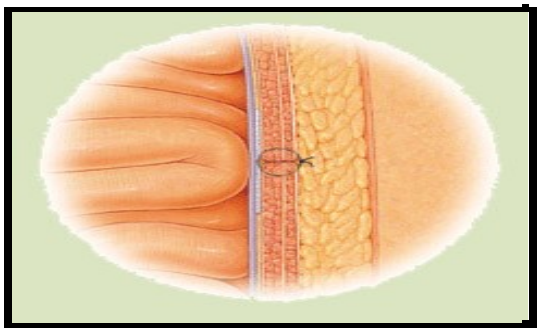


FIGURE 14 : LAPAROSCOPIC HERNIA REPAIR

Advantages-

1) Less postoperative pain.

2) Myopectineal orifice can be approached bilaterally.

3) Previous anterior herniorrhaphy/ recurrent hernia

COMPLICATIONS OF INGUINAL HERNIA REPAIR [17, 37-40, 48]

(I) Chronic groin pain after inguinal herniorrhaphy

Postoperative pain (also called inguinodynia) including

1) Nerve injury
2) Nerve entrapment.
3) Tissue damage.
4) Mesh mispositioned.
5) Contracted,and harden'd mesh reactions (Meshoma's).
6) Infection/sepsis.
7) Recurrent hernia.
8) Deep ring narrowing .
9) Periosteitis at pubic tubercle.

10) Post herniorrhaphy syndromes: somatic/ visceral / neuropathic .

(II) Wound infection in hernia repair [48]

(III) Cord and testicular complications

1) Hydrocele

2) Hematocele

3) Complications involving vas deference dysejaculation/transection .

4) Genitofemoral/ ilioinguinal nerve injury.

5) Damage to testes vascularity.

6) Ischemic orchitis and testicular atrophy

7) Testicular pain

8) Infertility

BIOMATERIALS [49-54]

Mesh materials 49, 50, 51

Meshes used for hernia repair are-

NONABSORBABLE	ABSORBABLE
Polypropylene	Polyglactin 910
Polyvinyl	Polyglycolic acid
polytetrafluoroethylene	
Polyamide	
Polyethylene terephtalate	

Type of Anaesthesia

Regional anaesthesia is used routinely,it can also be performed using local anaesthesia with intravenous sedation.

GIANT PROSTHETIC REINFORCEMENT OF THE VISCERAL SAC

The patients in this series had predominantly recurrent and Bilateral inguinal hernias. In bilateral GPRVS, the peritoneum of both groins is reinforced with a single prosthesis inserted in the preperitoneal space

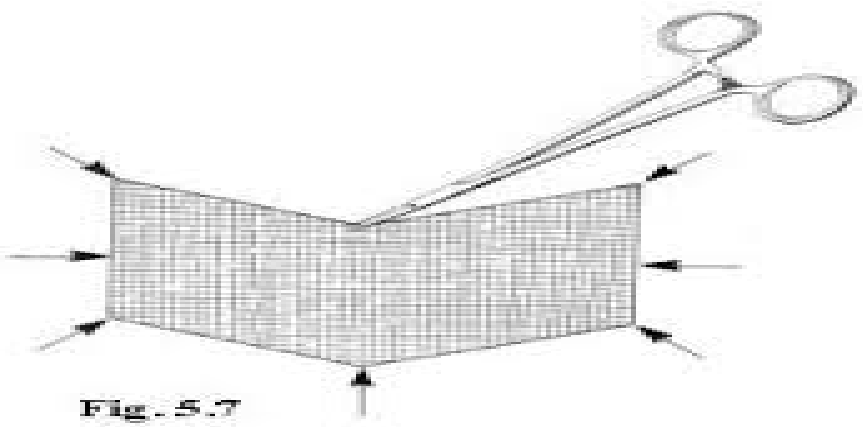


Fig. 5.7

Usually a chevron shaped mesh is used.

CLINICAL STUDY OF PREPERITONEAL MESH REPAIR IN BILATERAL AND RECURRENT INGUINAL HERNIAS:

SURGICAL TECHNIQUE

The technique developed by Stoppa was used with certain modifications.

ANESTHESIA: General anesthesia/spin al anesthesia

INCISION: Suprapubic pfannensteil incision is made.

FIG: Suprapubic Pfannensteil incision

MESH USED: Chevron shaped mesh with width 2cm less than the two anterior superior illiac spines.In our procedure a 15x15cm mesh was used.

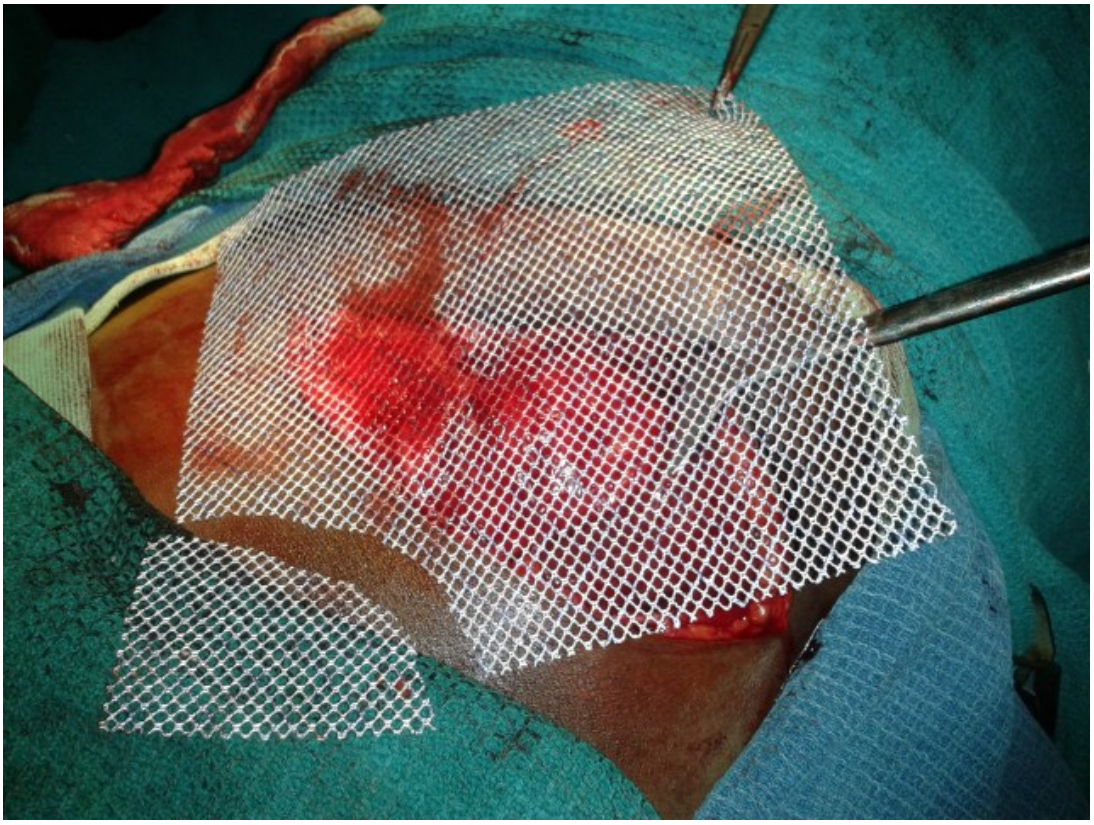


Fig: chevron shaped mesh

PROCEDURE:

The incision ranges 8 to 10 cm from the midline laterally, above the level of the internal ring. The intent is to expose the lateral aspect of the rectus sheath and divide it and the oblique muscles for a distance of 10 cm. Abdominal wall muscles are then retracted to

expose the transversalis fascia, allowing it to be incised.

FIG: Preperitoneal space

The peritoneum is left intact to maintain the procedure within the preperitoneal space

FIG:Parietal wall retracted to expose preperitoneal space

Wide dissection is then performed posterior to the rectus sheath and inferior epigastric vessels and continues laterally to beyond the anterior superior iliac spine. Inferiorly, the peritoneum is dissected to the division of the spermatic vessels and vas deferens.

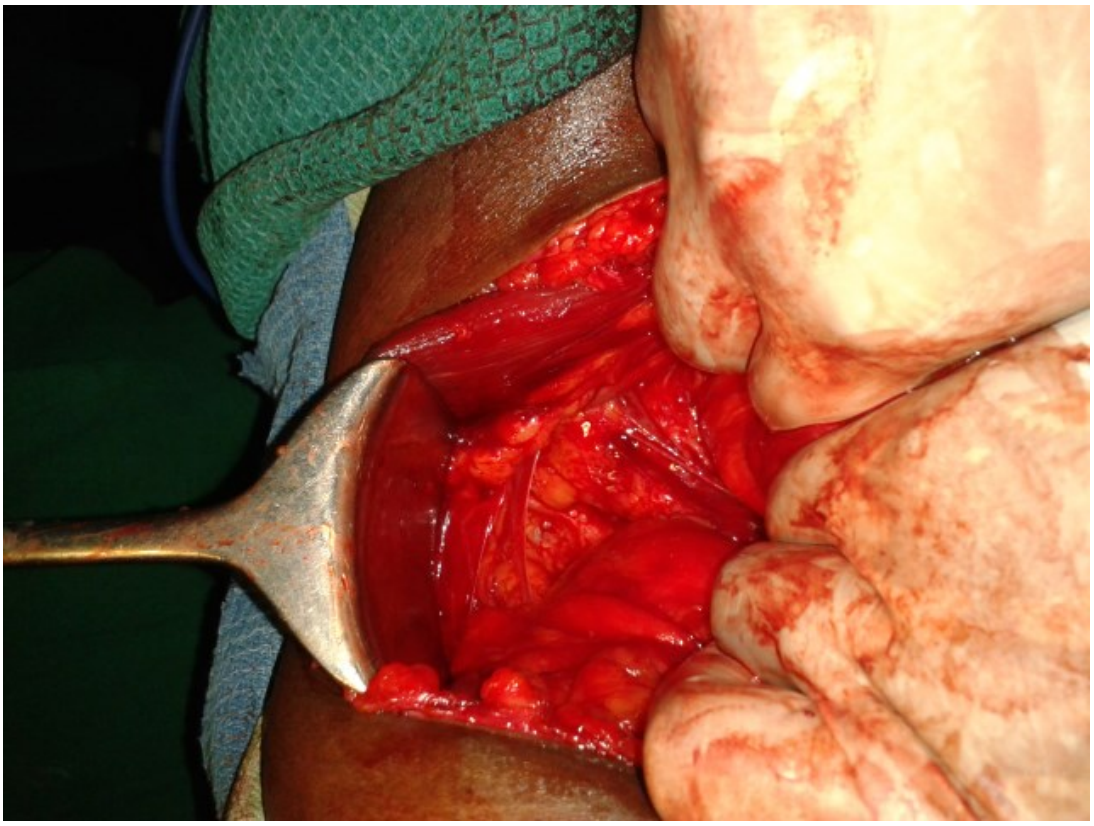


Fig: Retzius retropubic space and bogras space traced

The Retzius retropubic space and Bogros, are dissected from the posterior portion of the rectus abdominis muscle proceeding behind the epigastric vessels, and advanced into retroinguinal space and the iliopsoas muscle.

During reduction of hernial sacs, the spermatic cord and the gonadal vessels are parietalized and then separated direct and indirect sacs were reduced.

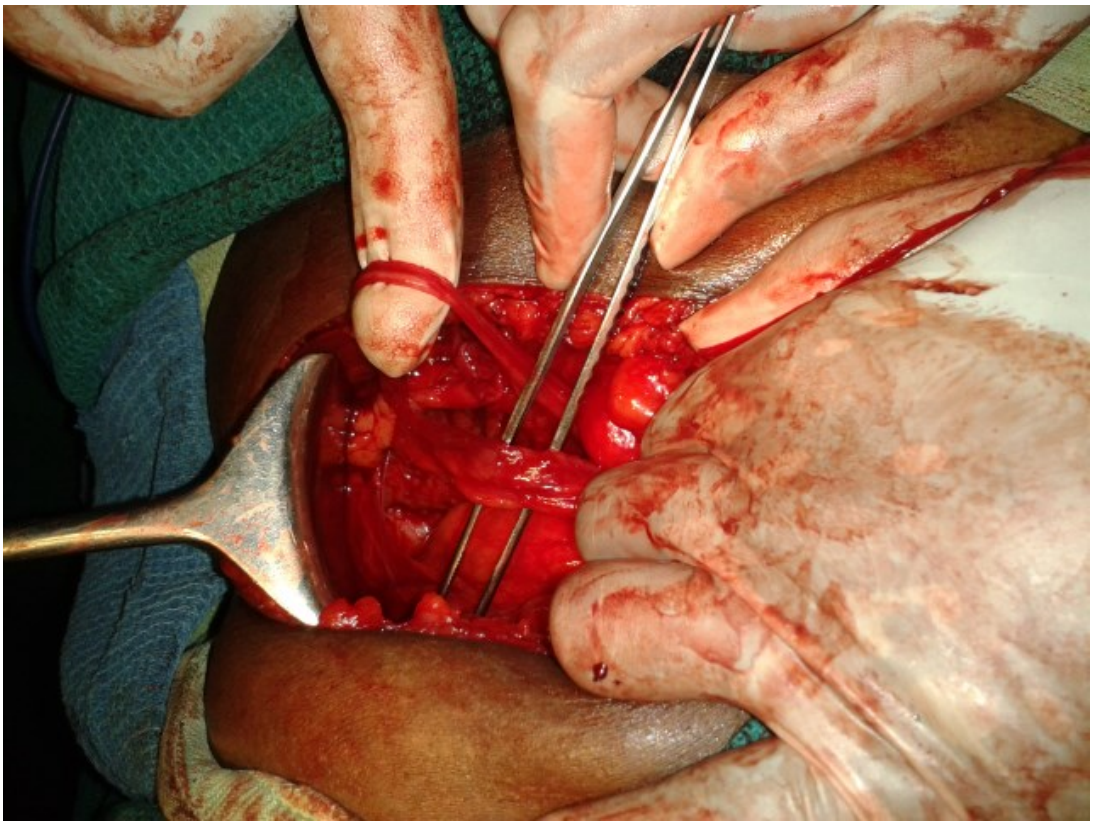


Fig: cord structures and gonodal vessels parietalised

.In case of large indirect sacs transfixation and ligation of sac was done.The chevron shaped mesh (Ethicon) is placed in the preperitoneal space with long clamps.Mesh is made to cover both direct

and indirect defects. The mesh is placed by stretching transversally.

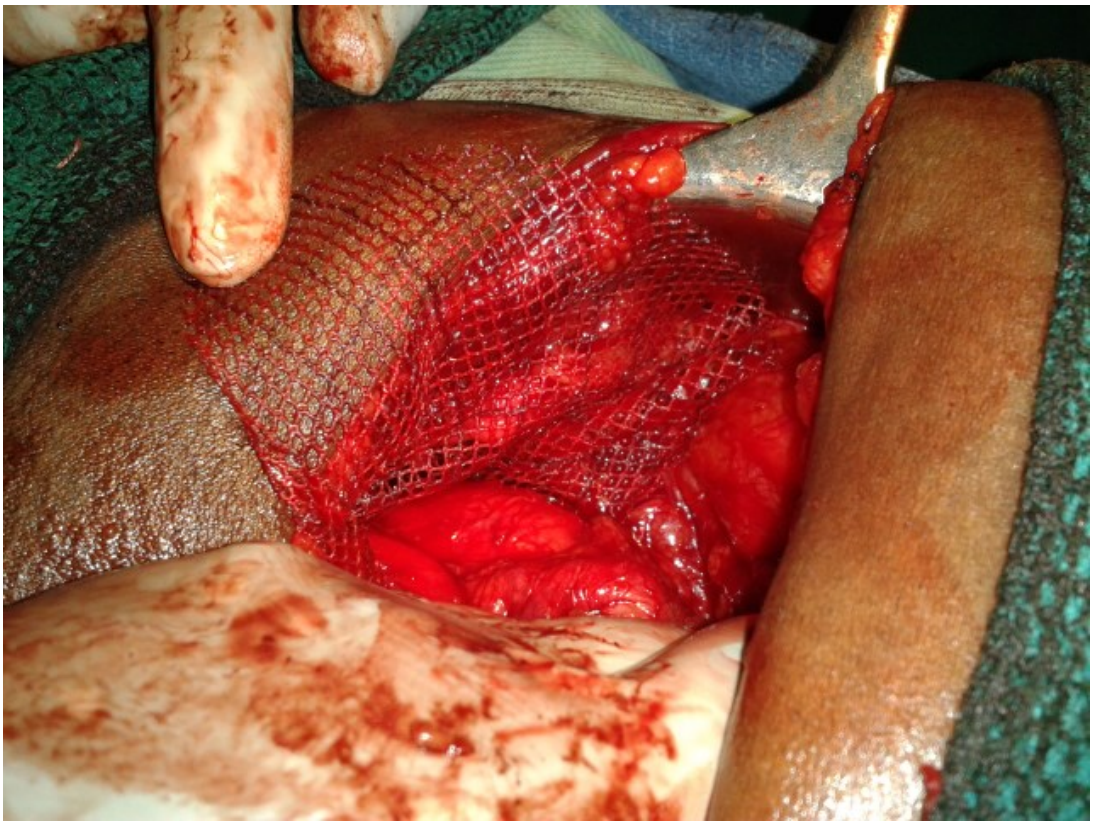


Fig: Mesh placed in the preperitoneal space

The assistant retracts the parietal wall while the surgeon depresses the peritoneal sac with the left hand, pulling toward him or her to open the preperitoneal space. The mid-portion of the mesh is fixed to superior pubic rami and pubic symphysis, laterally fixed to the illiopsoas muscle. The mesh is held in place by the intra-abdominal pressure.

Closed suction drainage is placed in position.

FIG:Postoperative picture with suction drain in position

Oral fluids started after 8 hours and patient mobilised early and advised to carry on his normal day today activities.

Fig: Healed postoperative scar

Indications and Contra-indications

We treated all types of hernias with this technique, mostly type II, IIIA and IV according to the Nyhus classification. So in our series there is not only treatment of bilateral inguinal hernias but also of recurrent inguinal hernias as well.

Recurrences after preperitoneal mesh repairs are usually treated with prosthetic repairs through an inguinal approach.

Technical problems

Problems during the learning period of the operation were difficulty in identifying the fascia transversalis. The fascia has to be incised and when it is opened the peritoneum will bulge out. Without tearing this tiny fascia, dissection must be continued medially for the identification of the epigastric vessels which stay attached to the abdominal wall.

The cord structures must always be identified and parietalised. Insufficient freeing of the sac from cord will result in a complete incorporation of the sac within the mesh in the lateral iliac fossa, and the recurrence of an indirect hernia is inevitable. Before the insertion

of the mesh, we have to be sure that the retractors are properly placed exposing the MPO. The bladder must always be emptied before the operation. A distended bladder makes dissection of the preperitoneal space hazardous and could result in an unexpected vesical perforation. so patients should be catheterised pre operatively itself.

MATERIALS AND METHODS

This is a prospective study done in medical college hospital attached to Tirunelveli Medical college with patients with bilateral inguinal hernias and recurrent inguinal hernias undergoing preperitoneal mesh repair for a period of 1.5 years under the guidance of Dr.B.M.Pabitha Devi M.S.

During my study I attended to 76 cases of bilateral inguinal hernia and recurrent inguinal hernias. To keep a proper record a proforma was planned which was completed in each case.

Cases were included in the study based on the following criteria:

- Bilateral and recurrent inguinal hernias.
- Willing to participate

Following patients were not included in the study:

- Complicated inguinal hernia
- Patients not willing to participate

All cases were evaluated by documenting history taking, physical examination and laboratory investigations.

Patients were explained about the type of surgery and anesthesia. Each patient was explained bout the advantage of the said surgery, short duration of surgery, less peri operative complication and cost effectiveness.

Following data were collected with respect to

- Duration of surgery
- Intra operative complication
- Post operative monitoring – pain, wound infection, time of ambulation
- Monitoring for recurrence

Patients were followed up at 1week, 6week and 1 year.

OBSERVATIONS

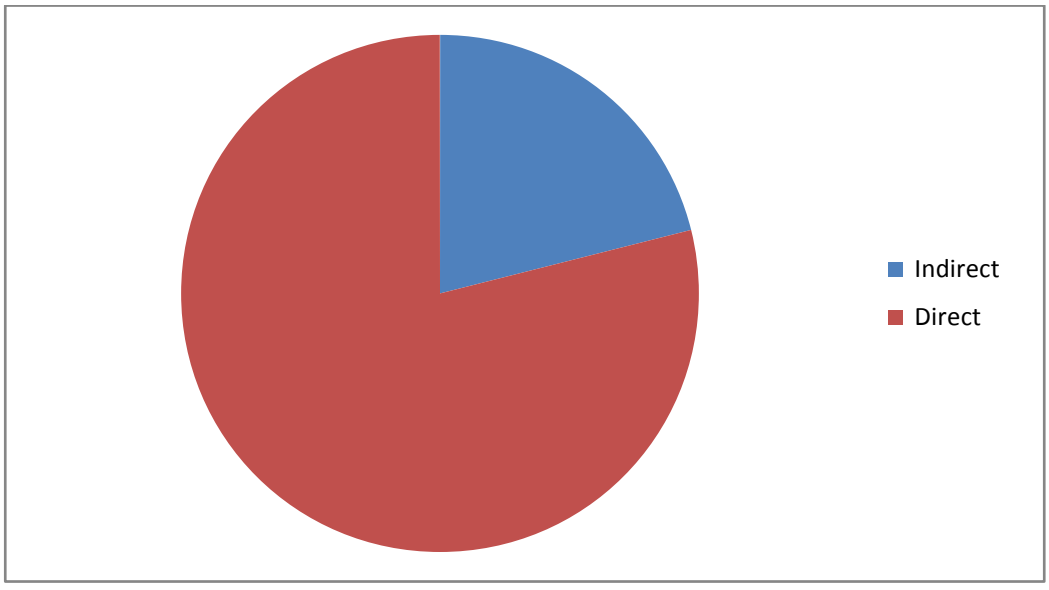
The following observations were done in the study

1) Clinical types

Among the 76 cases of bilateral inguinal hernia and recurrent inguinal hernias

Type	No .of patients	Percentage
Indirect	16	21%
Direct	60	79%

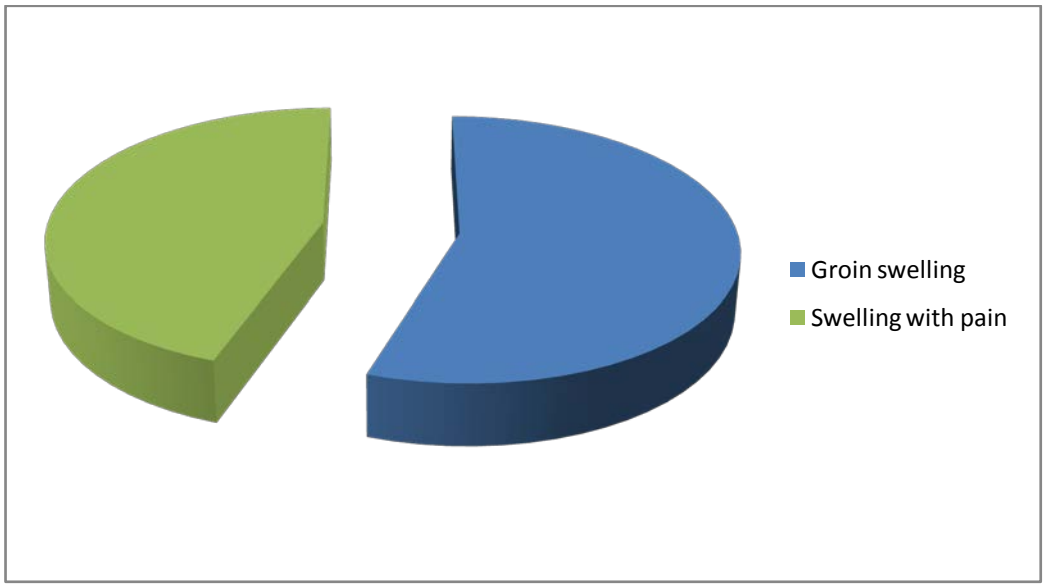
Our study shows that 79% were direct, 21% were indirect of all bilateral and recurrent inguinal hernias in study.



2) Mode of presentation

Symptoms	No. Of patients	Percentage
Groin swelling	42	55
Swelling with pain	34	45

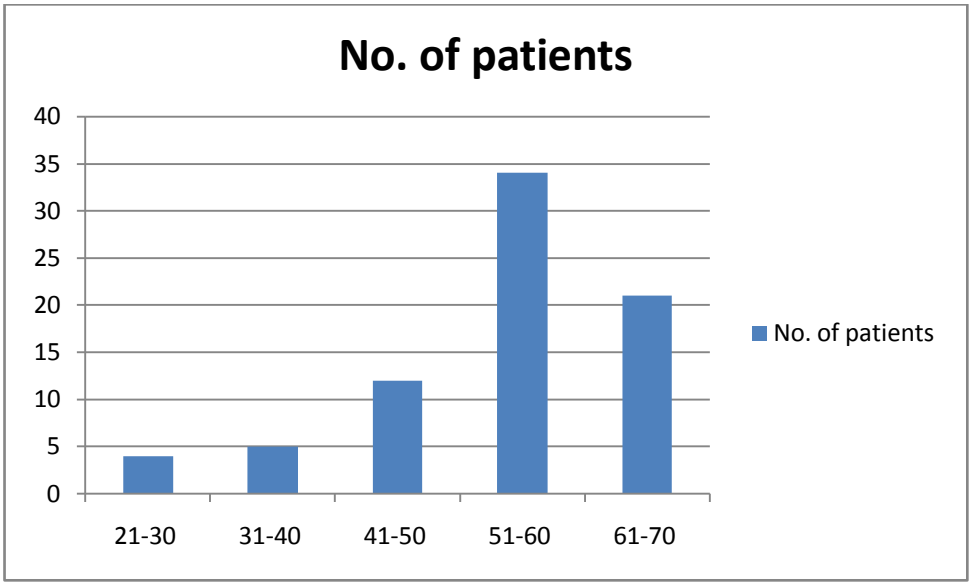
In our study groin swelling was most common presentation followed by pain with swelling.



3) Age at presentation

Age groups(yrs)	No. of patients	Percentage
21-30	4	5%
31-40	5	7%
41-50	12	16.%
51-60	34	45%
61-70	21	27%

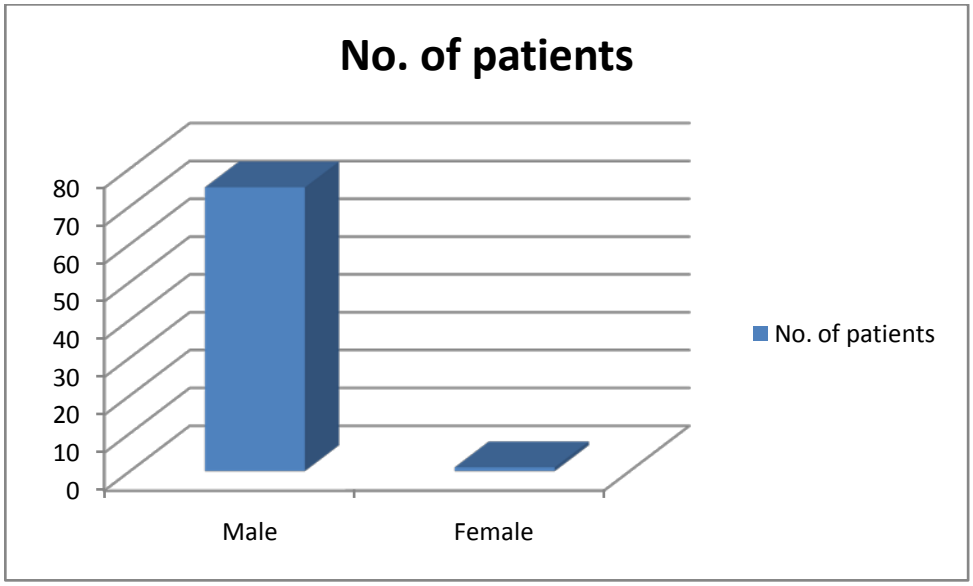
In our study most of patients presented in 51-60 yrs of age followed by 60-70yrs of age.



4) Sex distribution

Sex	No. of patients	Percentage
Male	75	98.68%
Female	01	1.31%

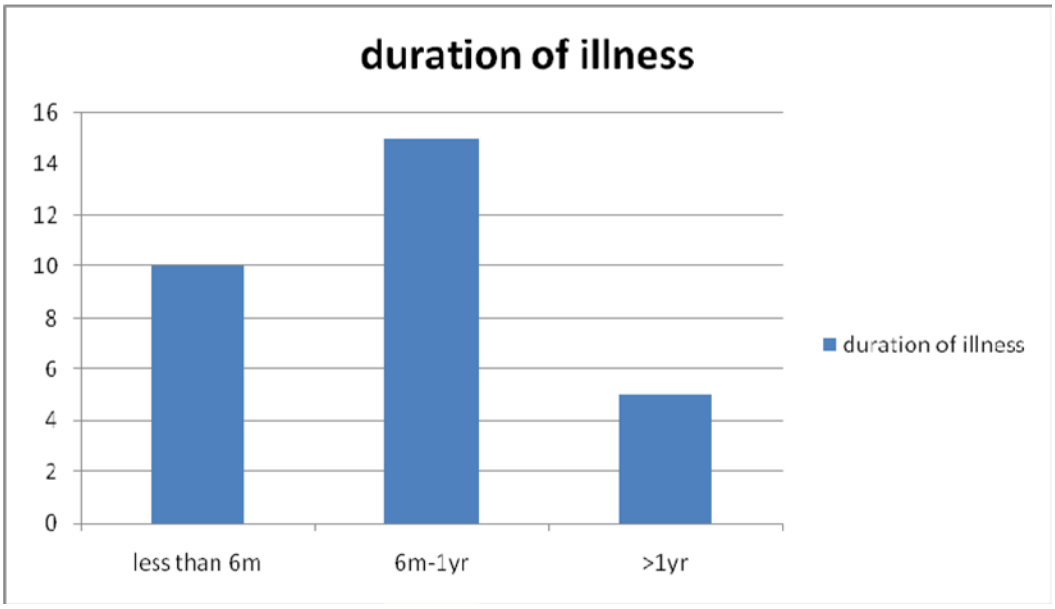
In our study most of the patients were male patients.



5) Duration of illness

Duration	No. of patients	Percentage
Less than 6 months	10	33.3%
6 months -1 year	15	50%
>1 year	5	16.7%

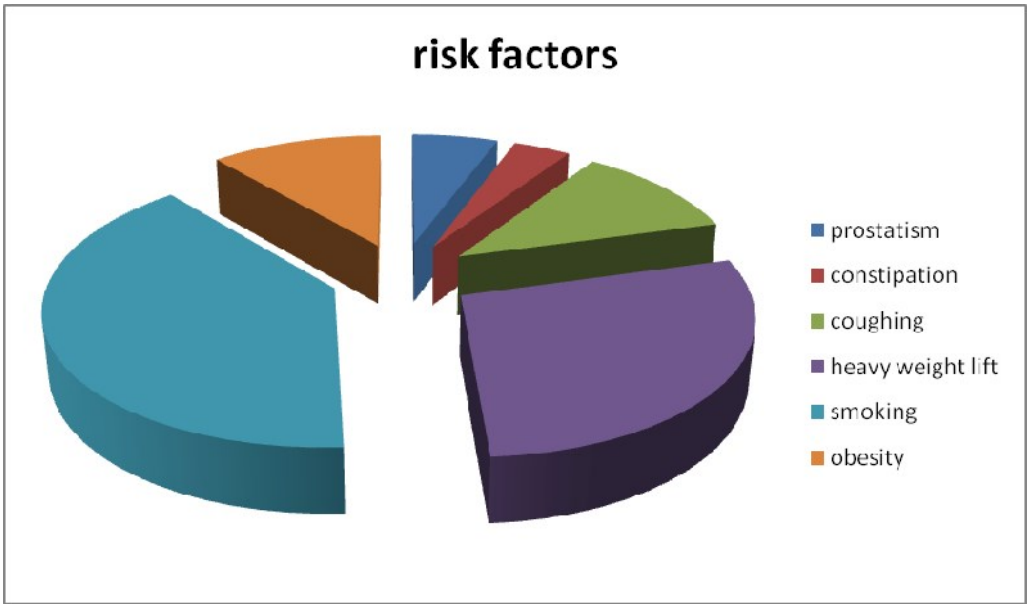
In our study most of the patients were presented 6months to 1 year of illness followed by 6 months.



6)Risk and predisposing factors

Risk factors	Patients	Percentage
Prostatisim	3	10%
Constipation	2	6.6%
Coughing	6	20%
Heavy weight lift	15	50%
Smoking	21	70%
Obesity	6	20%

In our study most of patients were smokers, heavy strenuous workers. Obstructive symptoms chronic cough, prostatisim were present.



7)Occupation

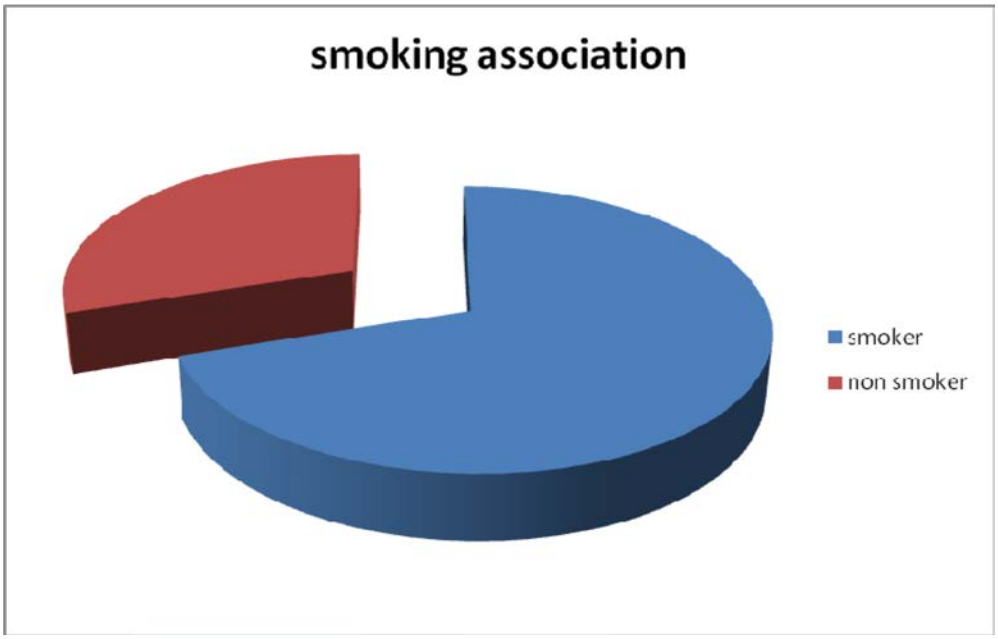
Occupation	Patients	Percentage
Heavy strenuous work	15	50%
Light work	9	30%
Retired and unemployed	6	20%

In our study most of patients were heavy strenuous workers.

8)Smoking

	Patients	**Percentage**
Smoker	21	70%
Non smoker	9	30%

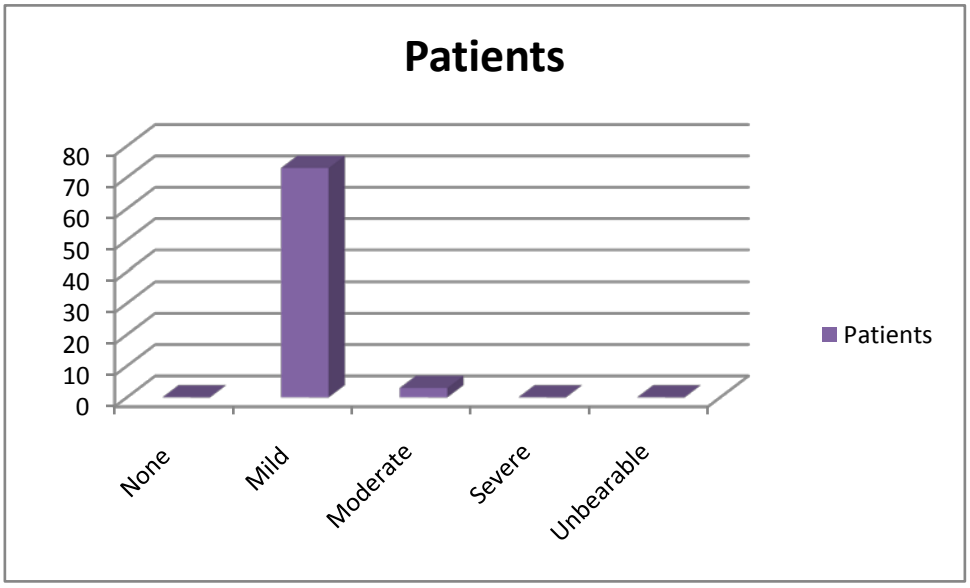
In our study smoking was associated with hernia in 70% of patients.



9) Post operative pain

Pain grading	Patients
None	0
Mild	73
Moderate	3
Severe	0
Unbearable	0

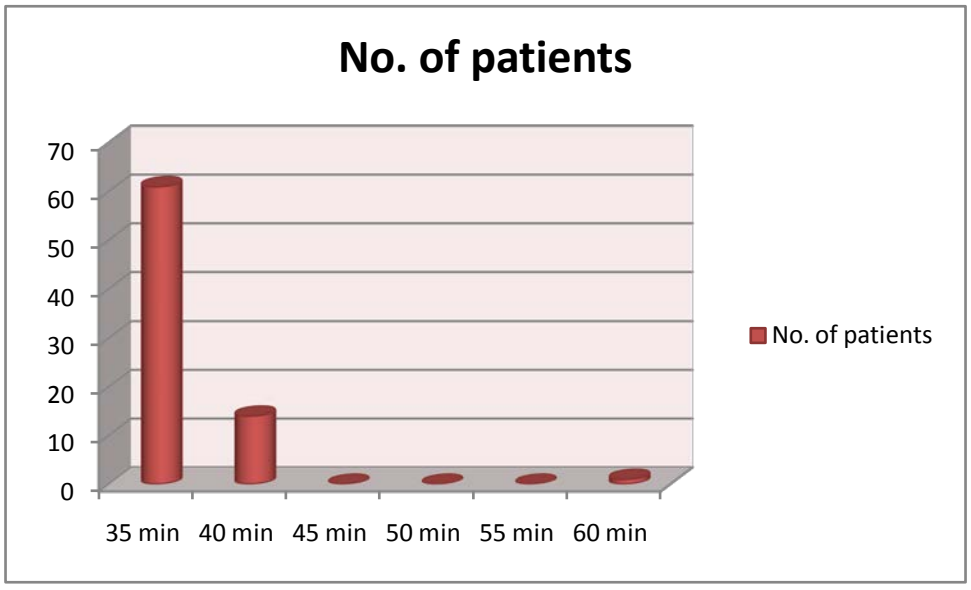
In our study most of patients had mild pain following surgery.



10)Time taken for the procedure

Time taken for the procedure	No. of patients
35 min	61
40 min	14
45 min	0
50 min	0
55 min	0
60 min	1

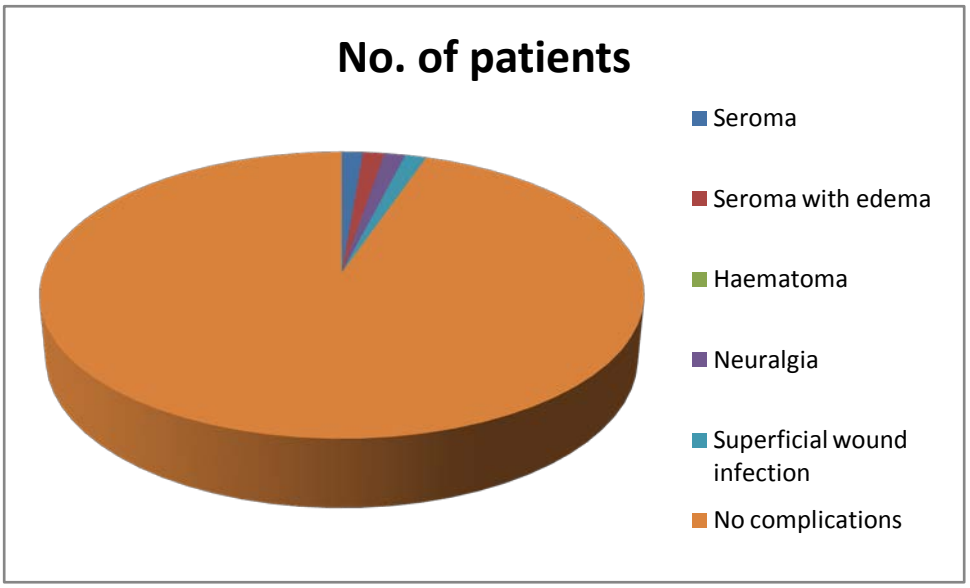
In our study time taken for surgery was around 35 min to 40 min.



11)Complication of hernia repair

Complication	No. of patients
Seroma	1
Seroma with edema	1
Haematoma	0
Neuralgia	1
Superficial wound infection	1
No complications	72

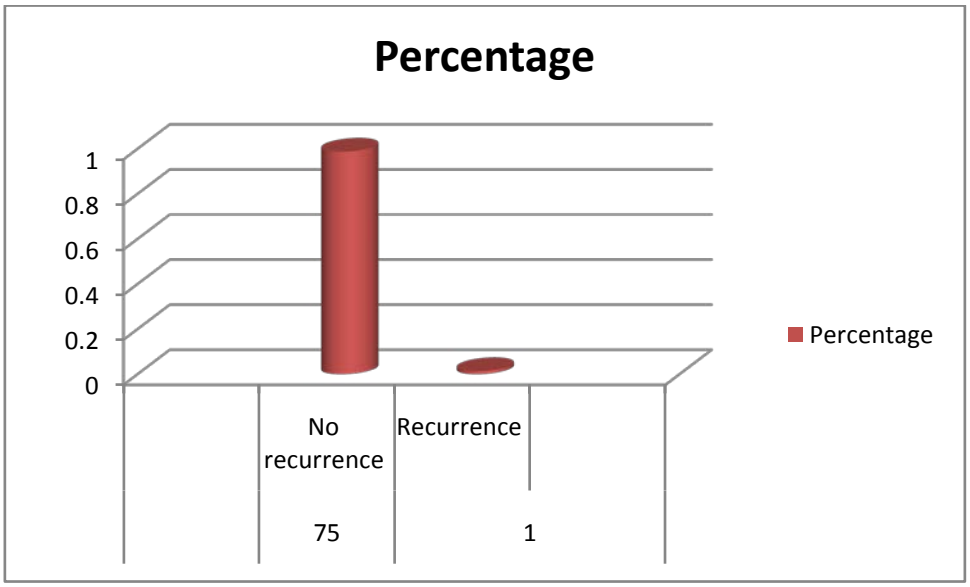
In our study post operative complications were seroma formation, superficial wound infection.



12)Recurrence following surgery

No of patients	Recurrence	Percentage
75	No recurrence	98.68%
1	Recurrence	1.31%

In our study one patient had recurrence which was treated with anterior approach.



13)Return to normal activity

The mean time taken for patients to get back to normal activity was 2 days.

DISCUSSION

Inguinal hernia surgery is the most frequently performed operation in general surgery and so even modest improvements in clinical outcomes are important.

The results of the present study were compared with those of the previous studies as follows:

1. **Age at presentation**

Age group (yrs)	Louies and Wendell[55]	Delvin [56]	Bholasingh sidhu[57]	Present study
31-40	16.2%	11.6%	28%	7%
41-50	17.3%	17.3%	20%	16.%
51-60	27.4%	28.6%	8%	45%
61-70	23.3%	-	24%	27%

The incidence of age at presentation of inguinal hernia was maximum between 30-60 yrs of life in a study by Louies and Wendell, Delvin and Bhola singh. In the above studies the

maximum incidence of age between 3rd and 6th decades of life, the results are comparable with present study.

2. **Sex distribution**

In study by Ira, 90% inguinal hernia cases were males and 10% females. Studies by Lichtenstein 94% were male patients and 6% female patients occurring at any age, males were more commonly affected than females. In this study 98.68% were male and 1.31% were females. The percentage of females within this study is less compared to other studies. This may due to the decreased awareness in women about hernia. Social, economic and education level of female patient contributing to the less no of female presenting to hospital with inguinal hernia in early stage in our study. This may be also due to difference in the embryology and anatomical content of the inguinal canal.

3. **Occupation**

In our study most of patient occupation (50%) involves strenuous work followed by light and indeterminate work

(30%). Rest of the patients were (20%) unemployed and sedentary.

In Bhola singh sidhu, 44% hernia patients were doing jobs,which involves strenuous work.

In present study, occupation involving strenuous work (50%) of the study population could be the precipitating factor by increasing the intra abdominal pressure.

4. **Mode of presentation**

Most common presentation of hernia is swelling. In present study of 76 patients 55% of patients presented with swelling in groin and 45% of patients presented with dragging type of pain along with swelling in groin. This shows that 45% of population neglected hernia till they developed pain. This negligence and decreased awareness among people leads to increase rate of complications. This needs emergency surgery with high morbidity and mortality.

5) Type of hernia

In our study 79% were direct and 21% were indirect hernias as bilateral hernias were mostly direct hernias .

6) Risk Factors

Factors which increase intra abdominal pressure	Jan Marie et al	Alan Hair et al	Present study
	33.5%	**28%**	**70%**

In our study 70% were smokers and 20% were obese (whose BMI > 26.5) prostate enlargement in 10% of patients.

These factors contributing for formation of hernia and have influence on present study population.

7) Duration of illness

Majority of patients in our study presented within 6 months to 1 year of duration of symptoms and operated. It is comparable to previous studies.

Duration	Bhola singh and sidhu	Present study
< 6 months	12%	33.3%
6 months- 1year	56%	50%
>1 year	32%	16.7%

8) Duration of hospital stay

The duration of post operative stay has been falling in recent years. In our study most of the patients were discharged on 2nd day and rest of the patients were discharged on the 3rd post operative day due to large hernia sac and cases that needed difficult dissection.

Previous studies show that post operative stay for short stay surgery was 2-3 days and 3-4 days (Clinique saint jean) [56] (Veenendaal LM)[57]

9) **Complications of hernia**

Local complications like seroma, pain were present .

All the complications were treated conservaively. In previous studies haemotoma noted in 3.8% of cases (Clinique saint jean) [56], 10.1% of Cases (Veenendaal LM)[57]. These are very less in the present study and comparable with the previous studies.

10) Return to normal activity

Return to normal activity does not only depend on the type of repair done and type of anaesthesia rather the patients attitude determined the time taken to return to normal work.

The mean time to return to normal activity was 2 days.

11) Recurrence

In present study the recurrence rate is 1.31%. However, the procedure is easy to do in experienced hands.

CONCLUSIONS

In our study bilateral and recurrent inguinal hernias were in age groups of 31 to 60yrs predominantly in 51 to 60 years of age.

a. 98.68% of our patients were males and 1.31% were females.

b. Bilateral Direct hernias were common in the study.

c. Straining which causes raised intra abdominal pressure, smoking, obesity, occupation, previous surgeries contribute to formation of hernia.

d. All patients were operated in spinal anesthesia.

e. Time taken for patients to get back to normal activity was 2-3 days.

f. Post operative pain was very less in our study.

g. The post operative complication rate was minimal and during the brief follow up there was one recurrence making upto 1.31%.

h. Pre peritoneal mesh repair technique was very cost effective and patients were satisfied with the Procedure executed.

i. This preperitoneal approach allows a minimal invasive tension free and suture less procedure, with protection for the nerves.

j. Study demonstrates that pre peritoneal mesh repair is a safe technique for operating on bilateral and recurrent inguinal hernias. However, the procedure is easy to perform in experienced hands. This technique must be compared to other inguinal hernia operation techniques in the near future.

SUMMARY

- Inguinal hernias are commonest of all surgeries done by general surgeons. It continues to provide the surgeons with major social, economic and surgical challenges.
- The present study was conducted at department of general surgery, tirunelveli medical college,. to know the age, sex and mode of presentation, type and location and complications of hernia repair.
- This study is also initiated to know the surgical outcome of bilateral and recurrent inguinal hernia repair by pre peritoneal mesh repair with respect to early post operative pain, duration of return to normal activity, early recurrence and cost effectiveness.
- A total of 76 patients were studied in age group of 20-70 yrs.
- In our study bilateral and recurrent inguinal hernias were seen in age groups of 31-60yrs predominantly in 50 to 60 years.
- 98.68% of our patients were males and 1.31% were females.
- Bilateral direct hernias were common in the study.

- The commonest presenting complaint was groin swelling, for duration of 6 months to 1 year. .
- Time taken for patients to get back to normal activity was 2-3 days.
- Most of the patients experienced no severe pain post operatively.
- The post operative complication rate was minimal and during the brief follow up there was one recurrence.
- Study demonstrates that the preperitoneal mesh repair is a safe technique for operating on bilateral and recurrent inguinal hernias. However, the procedure is easy to perform in experienced hands. This technique must be compared to other inguinal hernia operation techniques in the near future.

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ANNEXURE-I

PROFORMA

Case no : Name :

Address : Age :

Sex : Occupation :

DOA : DOS :
DOD :

Diagnosis : Contact no :

COMPLAINTS

1. Swelling
2. Pain in the swelling/Groin
3. Others

HISTORY OF PRESENTING ILLNESS

1. Swelling ii) Duration iii) Site and size iv) Rate of progression

   v) Reducibility +/-, Spontaneous/Manual
2. Pain in swelling : Absent /Present
3. Others : Abdominal pain/ Vomiting / Abdominal distention/ Fever
4. History of straining factors: chronic cough/ chronic constipation/ straining at micturition.

Past history:

I Previous surgery

1. For hernia

2. Other abdominal surgery (particularly appendicectomy by external grid iron incision)

II History of any associated medical condition

Diabetes / Hypertention / PTB / Cardiac oedema

Personal history

i. Nature of work : Sedentary/Moderate/Heavy ii. Anemia /Cyanosis/Jaundice/Clubbing/Dependent edema/Lymphadenopathy

iii. Vital signs : Temparature: Pulse: R?R: BP:

Local Examination

(Patient in standing and recumbent position)

INSPECTION

1. Swelling

bilateral

Position and Extent

Size and Shape

Type: incomplete / complete

Spontaneous visible peristalsis

2. Skin over the swelling
3. Expansile impulse on coughing
   Direction of impulse
4. Spontaneous reducibility in recumbent position

PALPATION

1) Swelling : warmth/tenderness

   Position and extent

   Consistency : Doughy and granular/ elastic/ tense

   Reducibility : Partial/complete/gurgling felt during reduction/not reducible

2) Scrotal invagination test

3) Internal ring occlusion test

AUSCULTATION: Bowel sounds +/-

EXAMINATION OF TONE OF MUSCLES: Presence of Malgainge's bulges.

STRAINING FACTORS

1) Phimosis / meatal stenosis / stricture urethra

2) Prostatic enlargement/ anorectal stenosis/ haemorrhoids/ fissure/ growth

3) Respiratory system: chronic cough/ chronic bronchitis/ bronchiectasis/ pulmonary tuberculosis

EXAMINATION OF OTHER SYSTEMS

1) Abdominal examination: presence of ascites/ abdominal mass

2) Respiratory system

3) Cardiovascular system

4) Per rectal examination

INVESTIGATIONS

1) Urine routine and microscopy
2) Blood: Hb- TC: DC:
3) Blood sugar
4) ECG
5) Chest x ray
6) USG abdomen and Inguinoscrotal region

TREATMENT

Pre operative

Per operative: Duration of surgery

Haemorrage

Bladder injury

Post operative: Pain

Ambulation

Seroma/haemotoma

Infection

Urinary retention

Post operative hospital stay

Suture removal

Return to normal activity

Resumption of profession work

Early recurrence

FOLLOW UP

Date/Complication/Treatment

ANNEXURE II

Patient's consent form

நோயாளிகளுக்கு அறிவிப்பு மற்றும் ஒப்புதல் படிவம்
மருத்துவ ஆய்வில் பங்கேற்பதற்கு

ஆய்வு செய்யப்படும் தலைப்பு :
பங்கு பெறுபவரின் பெயர் :
பங்கு பெறுபவரின் வயது :

		புங்கு பெறுவர் இதனை ✓ குறிக்கவும்
1	நான் மேலே குறிப்பிட்டுள்ள மருத்துவ ஆய்வின் விவரங்கள் நான் படித்து புரிந்து கொண்டேன். என்னுடைய சந்தேகங்களை கேட்கவும், அதற்கான தகுந்த விளக்கங்களை பெறவும் வாய்ப்பளிக்கப்பட்டுள்ளது என அறிந்து கொண்டேன்	☐
2	நான் இவ்வாய்வில் தன்னிச்சையாக தான் பங்கேற்கிறேன். எந்த காரணத்தினாலோ எந்த கட்டத்திலும், எந்த சட்ட சிக்கலுக்கும் உட்படாமல் நான் இவ்வாய்வில் இருந்து விலகி கொள்ளலாம் என்றும் அறிந்து கொண்டேன்.	☐
3	இந்த ஆய்வு சம்பந்தமாகவோ, இதை சார்ந்து மேலும் ஆய்வு மேற்கொள்ளும் போதும் இந்த ஆய்வில் பங்குபெறும் மருத்துவர் என்னுடைய மருத்துவ அறிக்கைகளை பார்ப்பதற்கு என் அனுமதி தேவையில்லை என அறிந்து கொள்கிறேன். நான் ஆய்வில் இருந்து விலகிக் கொண்டாலும் இது பொருந்தும் என அறிகிறேன்.	☐
4	இந்த ஆய்வில் மூலம் கிடைக்கும் தகவலையோ, முடிவையோ பயன்படுத்திக் கொள்ள மறுக்க மாட்டேன்.	☐
5	இந்த ஆய்வில் பங்கு கொள்ள ஒப்புக் கொள்கிறேன். எனக்கு கொடுக்கப்பட்ட அறிவுரைகளின்படி நடந்து கொள்வதுடன், ஆய்வை மேற்கொள்ளும் மருத்துவ அணிக்கு உண்மையுடன் இருப்பேன் என்று உறுதியளிக்கிறேன். என் உடல் நலம் பாதிக்கப்பட்டாலோ, அல்லது எதிர்பாராத, வழக்கத்திற்கு மாறான நோய்குறி தென்பட்டாலோ உடனே இதை மருத்துவ அணியிடம் தெரிவிப்பேன் என உறுதி அளிக்கிறேன்.	☐

பங்கேற்பவரின் கையொப்பம் / ..... இடம்.....தேதி.....
கட்டைவிரல் ரேகை
பங்கேற்பவரின் பெயர் மற்றும் விலாசம்.....
ஆய்வாளரின் கையொப்பம் / ..... இடம் ..... தேதி.....
ஆய்வாளரின் பெயர்.....
மையம் .....
கல்வியறிவு இல்லாதவற்கு (கைரேகை வைத்தவர்களுக்கு) இது அவசியம் தேவை
சாட்சியின் கையொப்பம் / ..... இடம் ..... தேதி .....
பெயர் மற்றும் விலாசம் .....

ANNEXURE-III

KEY TO MASTER CHART

I.P.NO.	Inpatient number
SL.NO.	Serial number
D.O.A.	Date of admission
D.O.S.	Date of surgery
D.O.D.	Date of discharge
Post.op.Comp.	Postoperative complications

ANNEXURE- IV

MASTER CHART

Sl no	Name	age	sex	ip no	occpation	bilateral hernias recurrent hernias	symptom	indirect/direct	signs	DOA	DOS	DOD	Surgical management	post op complications hematoma	infection	seroma	urine retention	duration of hospital stay	recurrence	follow up
1	manimuthu	56	male	55221	daily labourer	bilateral	pain,swelling	direct	swelling,cough impulse+	27-07-2013	29-07-2013	31-07-2013	preperitoneal mesh repair	nil	nil	nil	nil	5 days	nil	1year 6 months
2	maruthupandi	48	male	44602	shop keeper	bilateral	swelling	direct	swelling,cough impulse+	29-07-2013	27-07-2013	29-07-2013	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1year 4 months
3	ramalingam	60	male	50038	farmer	bilateral	pain,swelling	direct	swelling,cough impulse+	22-08-2013	24-08-2013	26-08-2013	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1year 3 months
4	marimuthu	46	male	51368	daily labourer	bilateral	pain,swelling	direct	swelling,cough impulse+	01-09-2013	03-09-2013	05-09-2013	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1year 3 months
5	michael rayappan	60	male	52672	driver	bilateral	swelling	direct	swelling,cough impulse+	05-09-2013	07-09-2013	09-09-2013	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1year 3 months
6	krisnnasamy	80	male	55240	shop keeper	bilateral	swelling	direct	swelling,cough impulse+	29-09-2013	01-10-2013	03-10-2013	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1year 3 months
7	xavier raj	38	male	56754	daily labourer	bilateral	swelling	indirect	swelling,cough impulse+	29-09-2013	01-10-2013	03-10-2013	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1year 3 months
8	arunachalam	55	male	59441	farmer	bilateral	pain,swelling	direct	swelling,cough impulse+	10-10-2013	12-10-2013	14-10-2013	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1year 3 months
9	ganesan	50	male	59433	farmer	bilateral	pain,swelling	direct	swelling,cough impulse+	24-10-2013	26-10-2013	28-10-2013	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1year 2 months
10	sankaran	60	male	75066	daily labourer	bilateral	pain,swelling	direct	swelling,cough impulse+	29-12-2013	31-12-2013	02-12-2013	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1year 2 months
11	ganesan	53	male	69198	daily labourer	bilateral	swelling	direct	swelling,cough impulse+	29-12-2013	31-12-2013	02-01-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1year 3 months
12	singaravel	53	male	5111	farmer	bilateral	swelling	direct	swelling,cough impulse+	30-01-2014	01-02-2014	03-02-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1year 3 months
13	rajasingh	22	male	6444	student	bilateral	swelling	indirect	swelling,cough impulse+	06-02-2014	08-02-2014	10-02-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1 year 3 months
14	lakshmanan	47	male	6369	farmer	recurrent	pain,swelling	direct	swelling,cough impulse+	06-02-2014	08-02-2014	10-02-2014	preperitoneal mesh repair	nil	present	nil	nil	6 days	nil	1 year 3 months
15	tamilarasi	30	female	9113	shop keeper	bilateral	swelling	indirect	swelling,cough impulse+	20-02-2014	22-02-2014	24-02-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1 year 3 months
16	ponnusamy	60	male	11897	farmer	bilateral	pain,swelling	direct	swelling,cough impulse+	06-03-2014	08-03-2014	10-03-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1 year 3 months
17	krisnnasamy	67	male	13445	farmer	bilateral	pain,swelling	direct	swelling,cough impulse+	20-03-2014	22-03-2014	25-03-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1 year 3 months
18	chelliah	70	male	14830	farmer	bilateral	swelling	direct	swelling,cough impulse+	22-03-2014	25-03-2014	27-03-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1 year 3 months
19	deva ananth	42	male	16429	daily labourer	bilateral	pain,swelling	indirect	swelling,cough impulse+	27-03-2014	29-03-2014	31-03-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1 year 3 months
20	mariappan	43	male	16199	daily labourer	bilateral	pain,swelling	indirect	swelling,cough impulse+	30-03-2014	01-04-2014	03-04-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1 year 3 months
21	arumugam	58	male	17565	farmer	bilateral	swelling	direct	swelling,cough impulse+	31-03-2014	03-04-2014	06-04-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1 year 3 months
22	mariappan	53	male	21553	farmer	bilateral	swelling	direct	swelling,cough impulse+	23-04-2014	26-04-2014	28-04-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1 year 3 months
23	perumal	68	male	21632	farmer	bilateral	pain,swelling	direct	swelling,cough impulse+	27-04-2014	29-04-2014	01-05-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1 year 3 months
24	antony	60	male	21542	farmer	bilateral	swelling	direct	swelling,cough impulse+	27-04-2014	29-04-2014	01-05-2014	preperitoneal mesh repair	nil	nil	present	nil	6 days	nil	1 year 3 months
25	murugan	37	male	21545	shop keeper	bilateral	swelling	indirect	swelling,cough impulse+	27-04-2014	29-04-2014	01-05-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1 year 3 months
26	arumumugasamy	30	male	22881	daily labourer	bilateral	pain,swelling	indirect	swelling,cough impulse+	01-05-2014	03-05-2014	05-05-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1 year 3 months
27	sivanupandian	47	male	22941	daily labourer	bilateral	pain,swelling	indirect	swelling,cough impulse+	03-05-2014	06-05-2014	08-05-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1 year 3 months
28	madasamy	71	male	27359	farmer	bilateral	swelling	direct	swelling,cough impulse+	21-05-2014	24-05-2014	26-05-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1 year 3 months
29	manavalan	29	male	31890	farmer	bilateral	swelling	indirect	swelling,cough impulse+	11-06-2014	14-06-2014	16-06-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1 year 3 months
30	ramar	70	male	32891	farmer	bilateral	pain,swelling	direct	swelling,cough impulse+	12-06-2014	14-06-2014	17-06-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1 year 3 months
31	siva	65	male	33241	daily labourer	bilateral	pain,swelling	direct	swelling,cough impulse+	12-06-2014	14-06-2014	16-06-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1 year 3 months
32	jeyakumar	38	male	40808	daily labourer	bilateral	pain,swelling	indirect	swelling,cough impulse+	23-06-2014	26-07-2014	28-07-2014	preperitoneal mesh repair	nil	nil	present	nil	8 days	+	1year2months
33	adhinarayanan	52	male	41901	farmer	bilateral	swelling	direct	swelling,cough impulse+	23-06-2014	26-07-2014	28-07-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1year2months
34	moorthy	62	male	41998	daily labourer	bilateral	swelling	direct	swelling,cough impulse+	23-07-2014	26-07-2014	28-07-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1year2months
35	chelliah	60	male	42519	farmer	bilateral	swelling	direct	swelling,cough impulse+	31-07-2014	02-08-2014	04-08-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1year2months
36	ramaselvan	55	male	42918	daily labourer	bilateral	pain,swelling	direct	swelling,cough impulse+	30-07-2014	02-08-2014	04-08-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1 year
37	adhimoolam	42	male	43519	daily labourer	bilateral	pain,swelling	indirect	swelling,cough impulse+	10-08-2014	12-08-2014	14-08-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1 year
38	nainar	62	male	44512	farmer	bilateral	swelling	direct	swelling,cough impulse+	16-08-2014	18-08-2014	20-08-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1 year
39	muthiah	65	male	44932	farmer	bilateral	swelling	direct	swelling,cough impulse+	16-08-2014	18-08-2014	20-08-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1 year
40	murugan	42	male	45102	shop keeper	bilateral	swelling	direct	swelling,cough impulse+	23-08-2014	25-08-2014	27-08-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1 year
41	jesurajan	76	male	47579	farmer	bilateral	pain,swelling	direct	swelling,cough impulse+	28-08-2014	30-08-2014	02-09-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1 year
42	chelladurai	59	male	48112	daily labourer	bilateral	swelling	direct	swelling,cough impulse+	04-09-2014	06-09-2014	08-09-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1 year
43	mani	63	male	48312	farmer	bilateral	pain,swelling	direct	swelling,cough impulse+	04-09-2014	06-09-2014	08-09-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	1 year
44	arunachalam	70	male	48886	farmer	bilateral	swelling	direct	swelling,cough impulse+	11-09-2014	13-09-2014	15-09-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	11 months
45	selvaraj	52	male	49112	daily labourer	bilateral	swelling	direct	swelling,cough impulse+	11-09-2014	13-09-2014	15-09-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	11 months
46	ratnaraj	70	male	49212	farmer	bilateral	pain,swelling	direct	swelling,cough impulse+	10-09-2014	13-09-2014	15-09-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	11 months
47	kathar mydeen	54	male	50396	farmer	bilateral	pain,swelling	direct	swelling,cough impulse+	14-09-2014	16-09-2014	18-09-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	11 months
48	velayutham	50	male	50328	farmer	bilateral	pain,swelling	direct	swelling,cough impulse+	13-09-2014	16-09-2014	18-09-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	11 months
49	rajan	33	male	50998	daily labourer	bilateral	swelling	indirect	swelling,cough impulse+	20-09-2014	23-09-2014	25-09-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	11 months
50	palavesam	55	male	51111	daily labourer	bilateral	swelling	direct	swelling,cough impulse+	20-09-2014	23-09-2014	25-09-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	11 months
51	appukutty	61	male	51450	farmer	bilateral	pain,swelling	direct	swelling,cough impulse+	28-Sep	30-09-2014	03-10-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	11 months
52	chidambaram	58	male	52110	farmer	bilateral	pain,swelling	direct	swelling,cough impulse+	28-09-2014	30-09-2014	02-10-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	11 months
53	chellappa	51	male	53211	driver	bilateral	swelling	direct	swelling,cough impulse+	01-10-2014	04-10-2014	06-10-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	10 months
54	rajaram	48	male	53300	daily labourer	bilateral	swelling	indirect	swelling,cough impulse+	01-10-2014	04-10-2014	06-10-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	10 months
55	muthuraj	42	male	54394	daily labourer	bilateral	pain,swelling	indirect	swelling,cough impulse+	05-10-2014	07-10-2014	09-10-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	10 months
56	muthusamy	58	male	54991	farmer	bilateral	pain,swelling	direct	swelling,cough impulse+	05-10-2014	07-10-2014	09-10-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	10 months
57	shek mohammed	56	male	55501	farmer	bilateral	pain,swelling	direct	swelling,cough impulse+	12-10-2014	14-10-2014	16-10-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	10 months
58	ramasamy	66	male	55594	daily labourer	bilateral	swelling	direct	swelling,cough impulse+	12-10-2014	14-10-2014	16-10-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	10 months
59	chermakani	55	male	57033	daily labourer	bilateral	swelling	direct	swelling,cough impulse+	18-10-2014	21-10-2014	23-10-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	10 months
60	mohammed ali jinnal	55	male	57065	farmer	bilateral	swelling	direct	swelling,cough impulse+	18-10-2014	21-10-2014	23-10-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	10 months
61	shanmugavel	66	male	57885	farmer	bilateral	swelling	direct	swelling,cough impulse+	26-10-2014	28-10-2014	31-10-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	10 months
62	rajarajan	60	male	57912	farmer	bilateral	pain,swelling	direct	swelling,cough impulse+	26-10-2014	28-10-2014	31-10-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	10 months
63	murugiah	56	male	59662	farmer	bilateral	swelling	direct	swelling,cough impulse+	28-10-2014	01-11-2014	03-11-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	9 months

64	palani	58	male	59771	daily labourer	bilateral	swelling	direct	swelling,cough impulse+	29-10-2014	01-11-2014	03-11-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	9 months
65	mahesh	33	male	59676	shop keeper	bilateral	pain,swelling	indirect	swelling,cough impulse+	05-11-2014	08-11-2014	10-11-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	9 months
66	sundarajan	59	male	59771	farmer	bilateral	pain,swelling	direct	swelling,cough impulse+	06-11-2014	08-11-2014	10-11-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	9 months
67	thangapandi	82	male	61040	farmer	bilateral	pain,swelling	direct	swelling,cough impulse+	09-11-2014	11-11-2014	13-11-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	9 months
68	sekar	45	male	62529	daily labourer	bilateral	swelling	direct	swelling,cough impulse+	13-11-2014	15-11-2014	17-11-2014	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	9 months
69	vettaikaran	50	male	72955	daily labourer	bilateral	swelling	direct	swelling,cough impulse+	04-01-2015	06-01-2015	08-01-2015	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	8 months
70	murugan	55	male	210	farmer	bilateral	swelling	direct	swelling,cough impulse+	08-01-2015	10-01-2015	12-01-2015	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	7 months
71	vellayan	60	male	398	farmer	bilateral	swelling	direct	swelling,cough impulse+	08-01-2015	10-01-2015	12-01-2015	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	7 months
72	rathinam	55	male	1260	daily labourer	bilateral	swelling	direct	swelling,cough impulse+	11-01-2015	13-01-2015	15-01-2015	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	7 months
73	jeyapal	42	male	5665	daily labourer	bilateral	swelling	indirect	swelling,cough impulse+	01-02-2015	03-02-2015	05-01-2015	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	6 months
74	kulanthaisamy pandi	65	male	7249	farmer	bilateral	pain,swelling	direct	swelling,cough impulse+	08-02-2015	10-02-2015	12-02-2015	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	6 months
75	rajendran	53	male	7252	farmer	bilateral	swelling	direct	swelling,cough impulse+	11-02-2015	14-02-2015	16-02-2015	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	6 months
76	nainar moopanar	56	male	14798	farmer	bilateral	swelling	direct	swelling,cough impulse+	18-03-2015	21-03-2015	23-03-2015	preperitoneal mesh repair	nil	nil	nil	nil	6 days	nil	5 months